Introducción a Arduino

Organización del Computador I

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Microcontroller vs Microprocessor

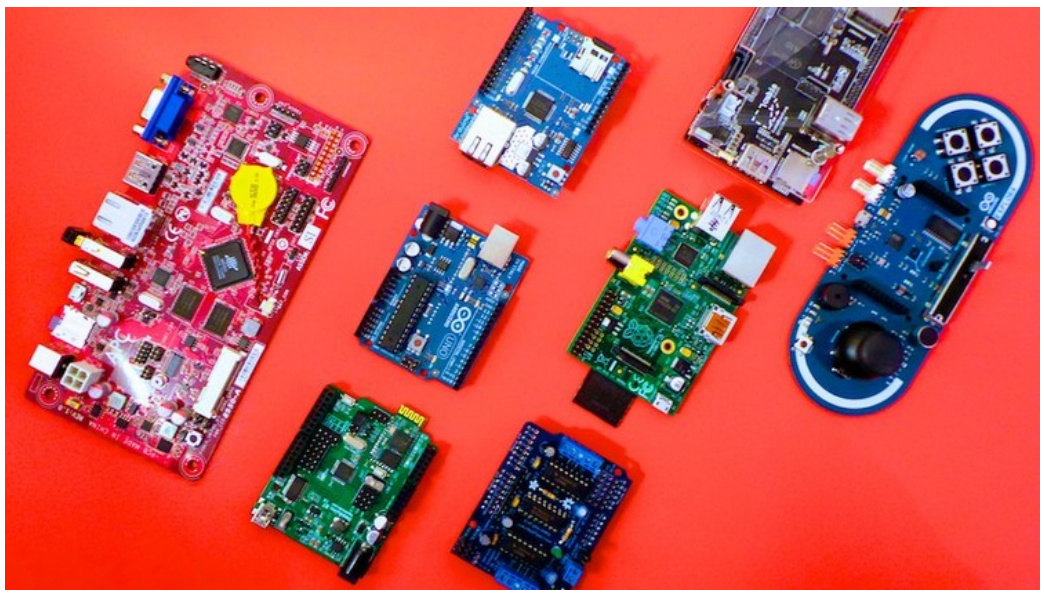
Microcontroller

- tipicamente de 8 Bits
- resuelve bien tareas específicas, e.g. lavarropas, microondas, etc.
- Un programa que se repite, almacenado en ROM
- IO onboard
- Poco Consumo

Microprocessor

- tipicamente de 32/64 Bits
- multiples programas
- Usos complejos, matemática, etc.
- IO externos, por ejemplo placas de video, red, etc.

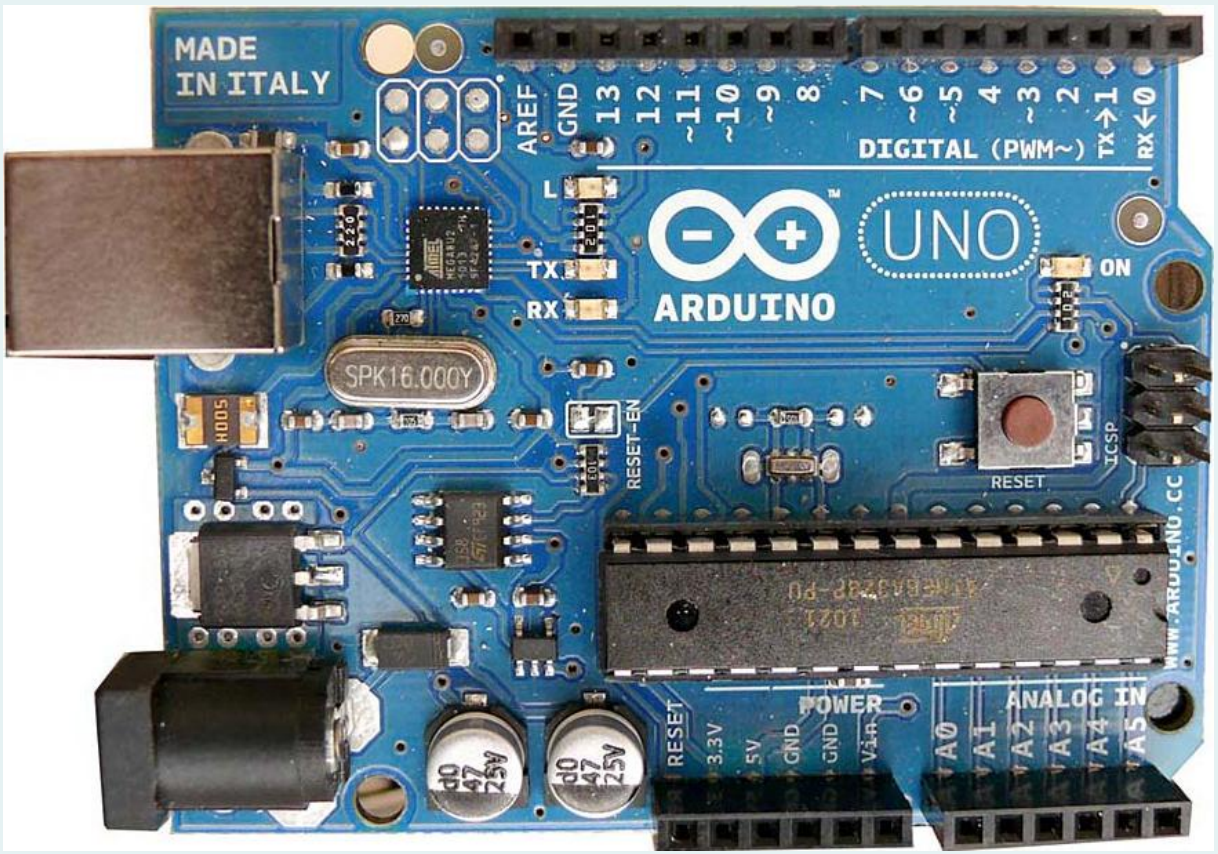
Algunas marcas y modelos. Atmega, PIC, Cypress, Intel, etc...



- Pic
  - 8-bit PIC® MCU
  - PIC10
  - PIC12
  - PIC16
  - PIC18
  - 16-bit PIC® MCU
  - PIC24F
  - PIC24H
  - PIC24E
  - 32-bit PIC® MCU
  - PIC32
- Atmega
  - AT32UC3L016
  - AT32UC3L032
  - AT32UC3L064
  - AT32UC3L0128
  - AT32UC3L0256
  - ATUC64L3U
  - ATUC128L3U
  - ATUC256L3U
  - ATUC64L4U
  - ATUC128L4U
  - ATUC256L4U

Arduino UNO

Esquema

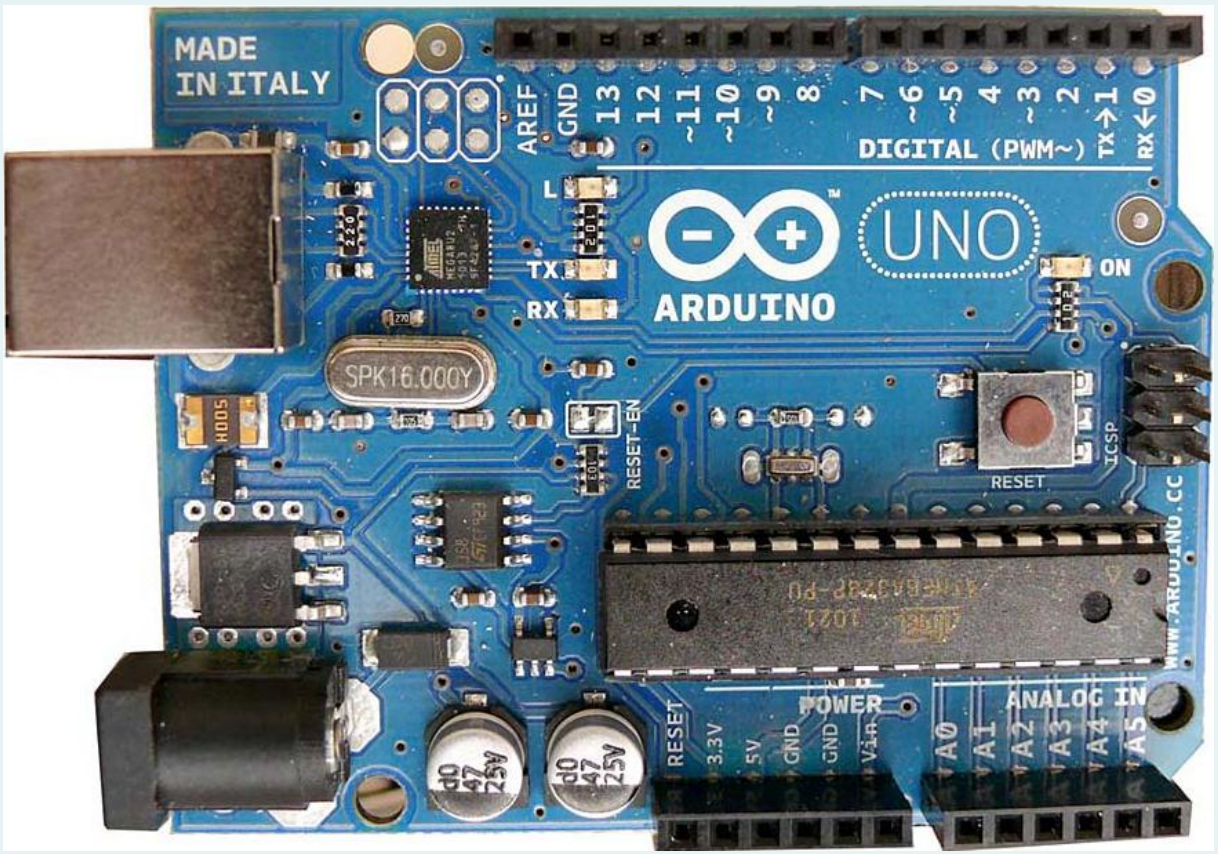


¿Qué es?

- Plataforma de cómputo
- Open Source
- Hardware Abstracted Wiring Language
- Programable por USB
- Popular
- Win-Mac-Linux
- Barato
- Todo en una sola placa
- Placa experimental. No para producción

Arduino UNO

Esquema

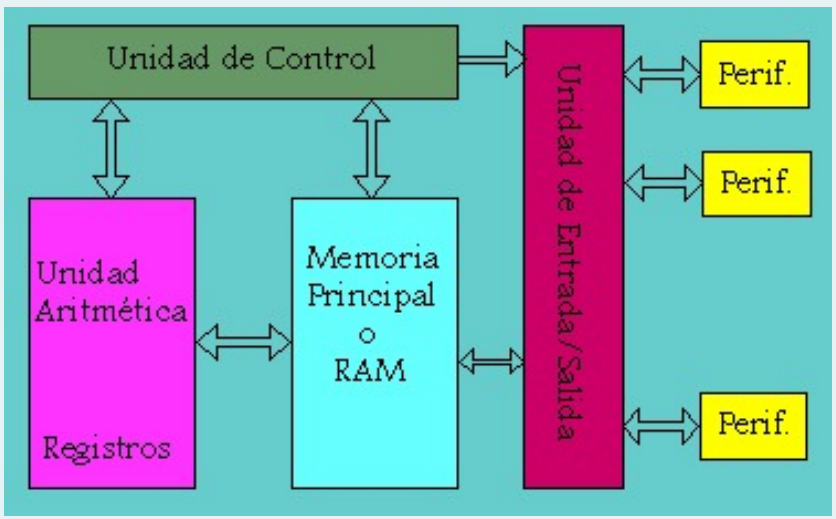


Especificaciones

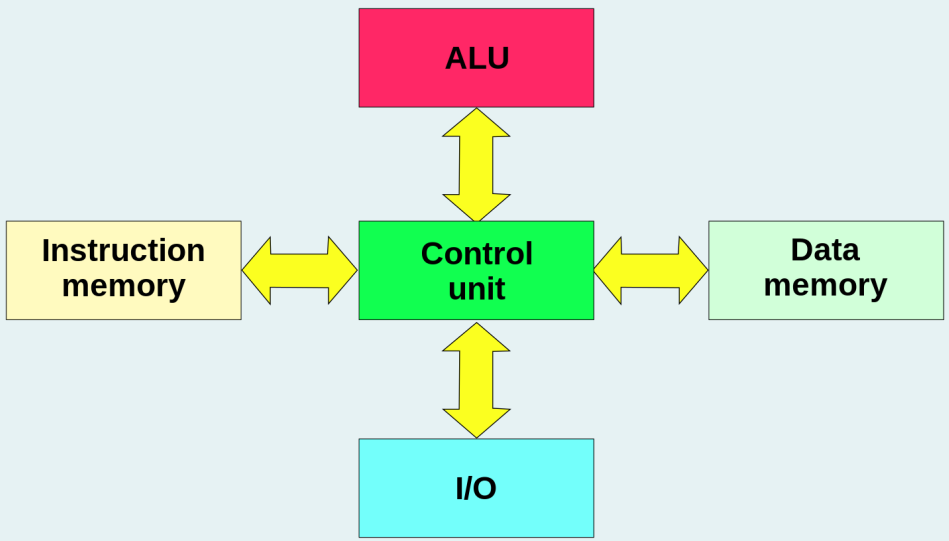
- Basado en ATmega328-8bits
- USB
- RISC, 16Mhz, 20 MIPS
- 2KB RAM !!
- 32 K Memory
- 1KB EEPROM
- 6 Ch 10 Bit A/D
- 13 Ch Digitales
- 3 timers
- 5 modos de ahorro de energía
- Arquitectura *Harvard*

Arquitectura Hardvard vs. Von Newmann

Von Newmann
(Lo que vienen viendo)



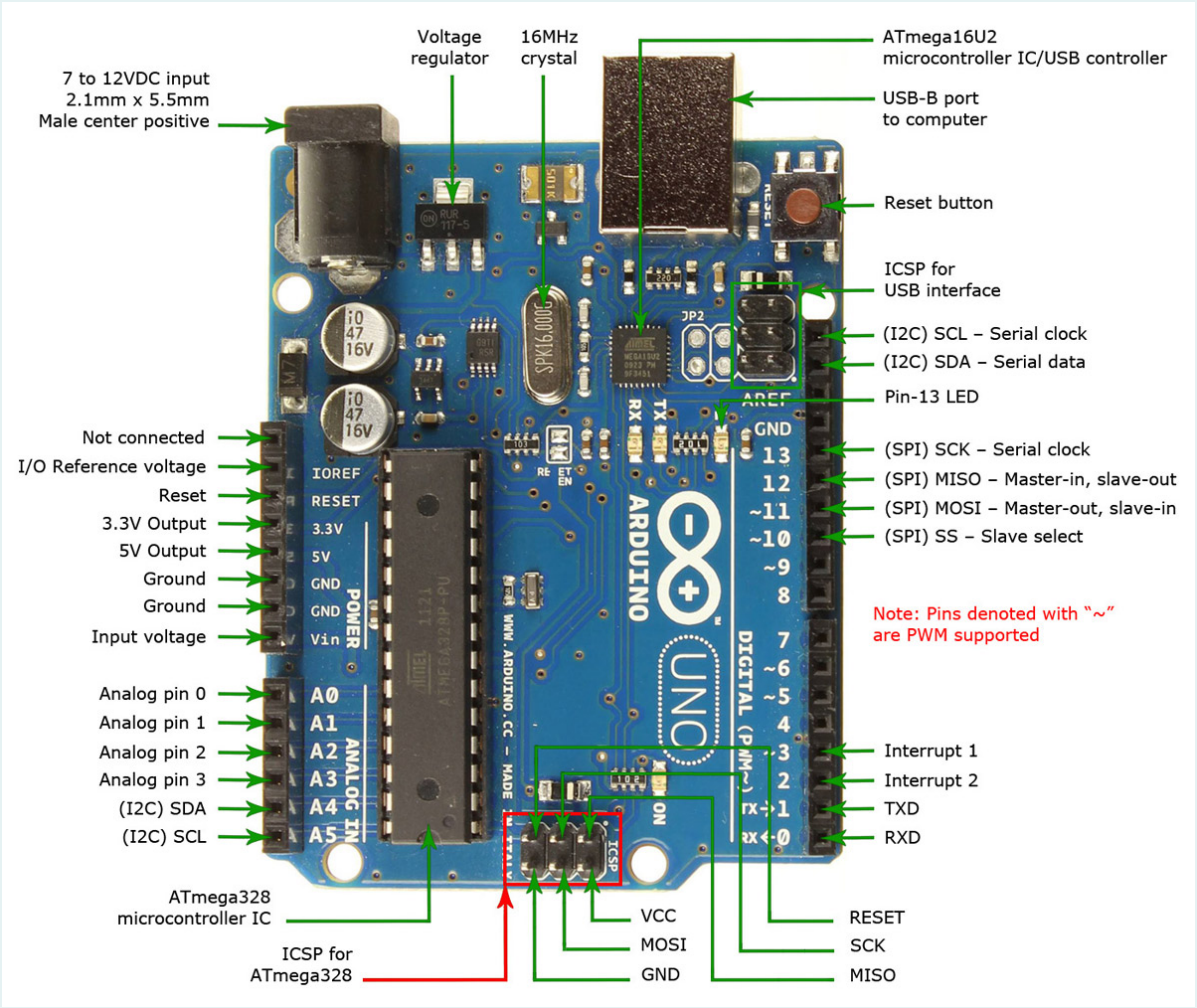
Hardvard



Aunque hoy por hoy casi siempre se usan modelos mixtos

Esquema del Arduino UNO

Esquema



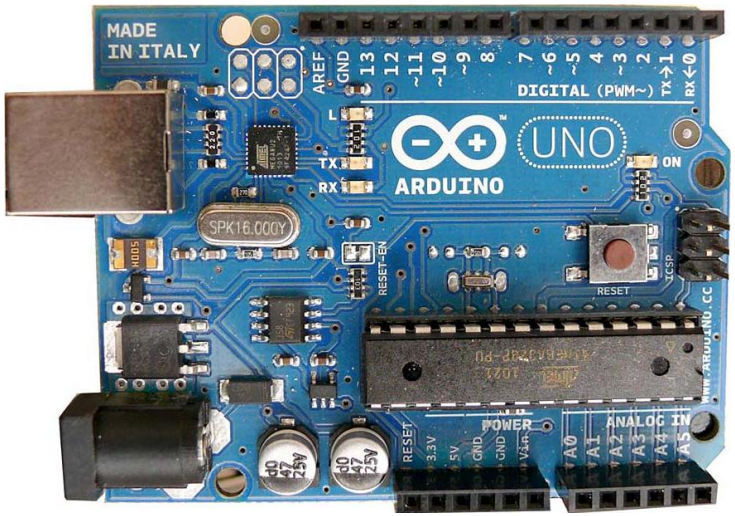
¿Qué podemos hacer?

- Digital IO (Leds,switches)
- Analog IO (resistive sensor data)
- Serial IO (Sensores, GPS, arduino, etc)
- Programable desde la Compu

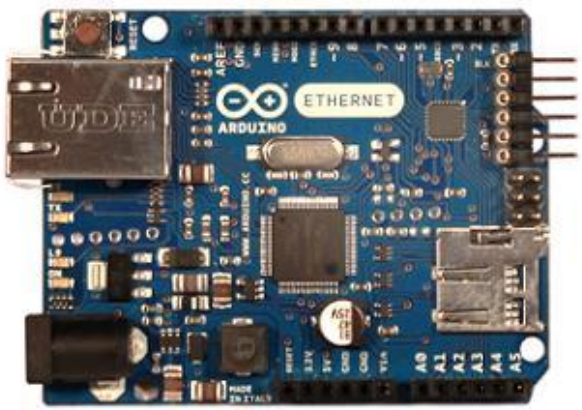
Arduino terminología

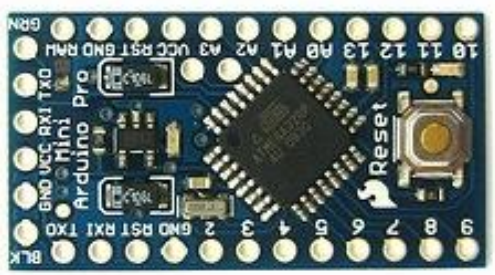
- IO Boards-micontrolador
- Shield - add-on boards
- Sketch - el programa
- Sensor - componentes(sensores de luz, etc.)
- Modules - serial data (GPS, etc.)

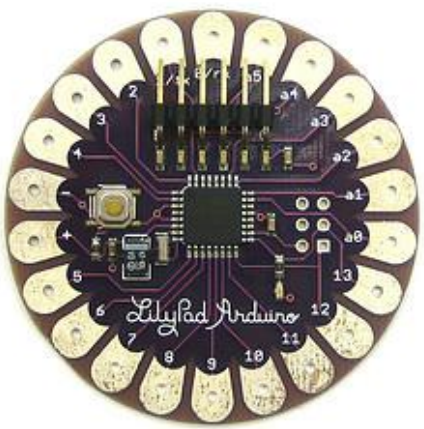
Aspecto


MADE
IN ITALY
UNO
ARDUINO
DIGITAL (PWM~)
POWER
ANALOG IN


MEGA ADK
ARDUINO

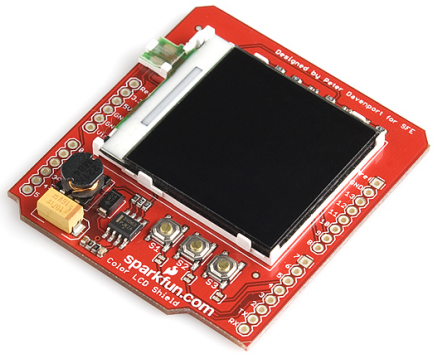

ETHERNET
ARDUINO

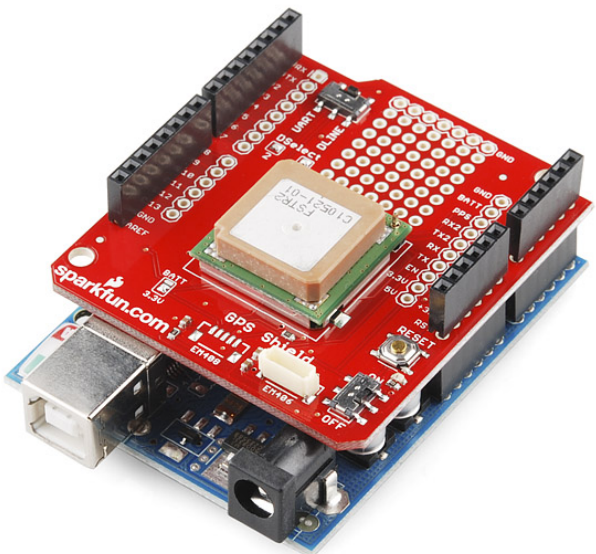

Arduino Pro Mini
Reset

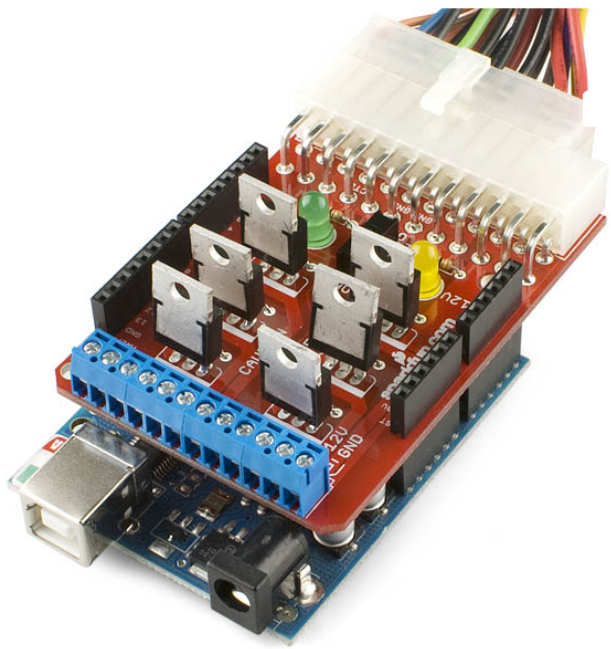

LilyPad Arduino

Shields

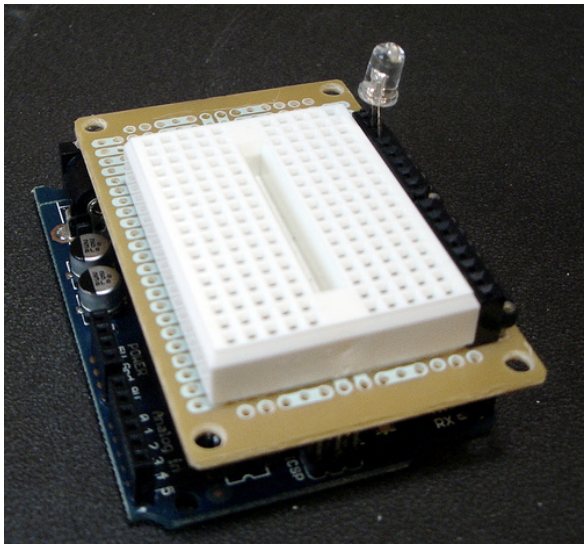

MAC NO:
FCC ID : T9JRN41-1
RoHS compliant

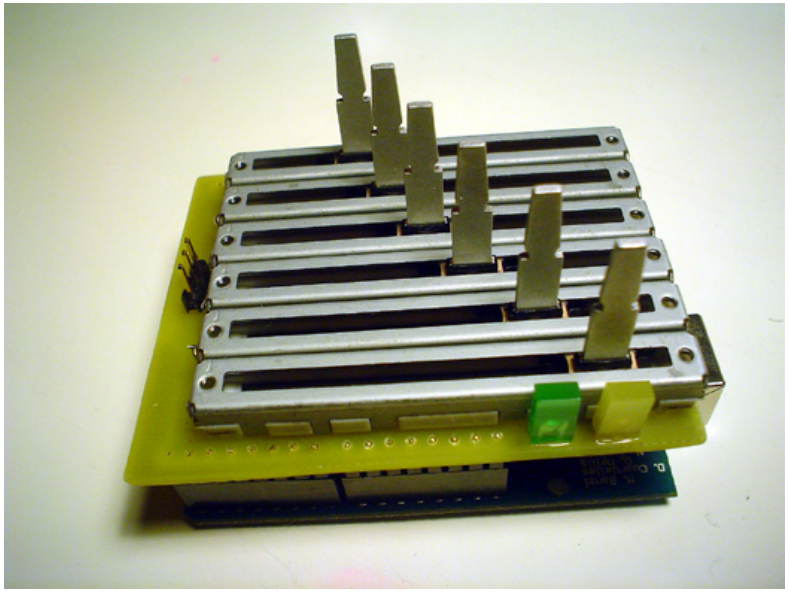

sparkfun.com


sparkfun.com
GPS Shield

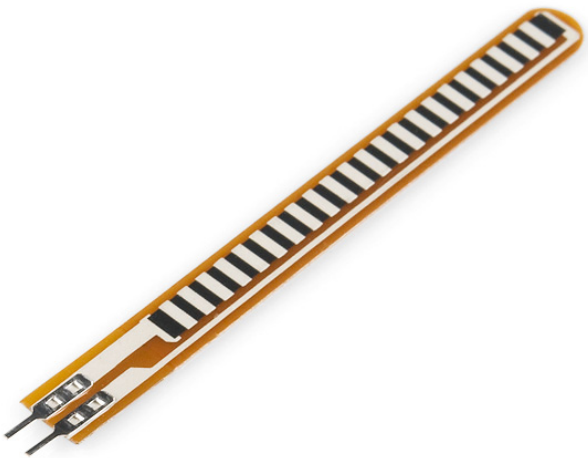


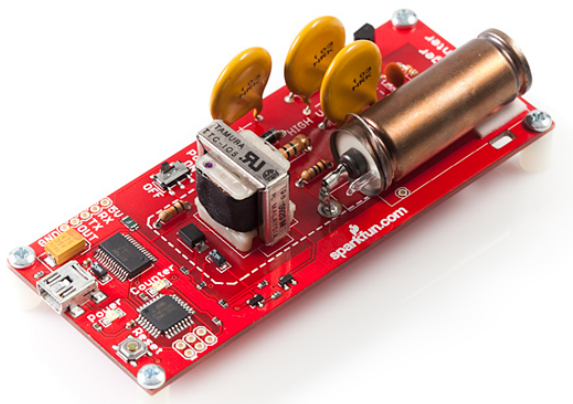
Shields...





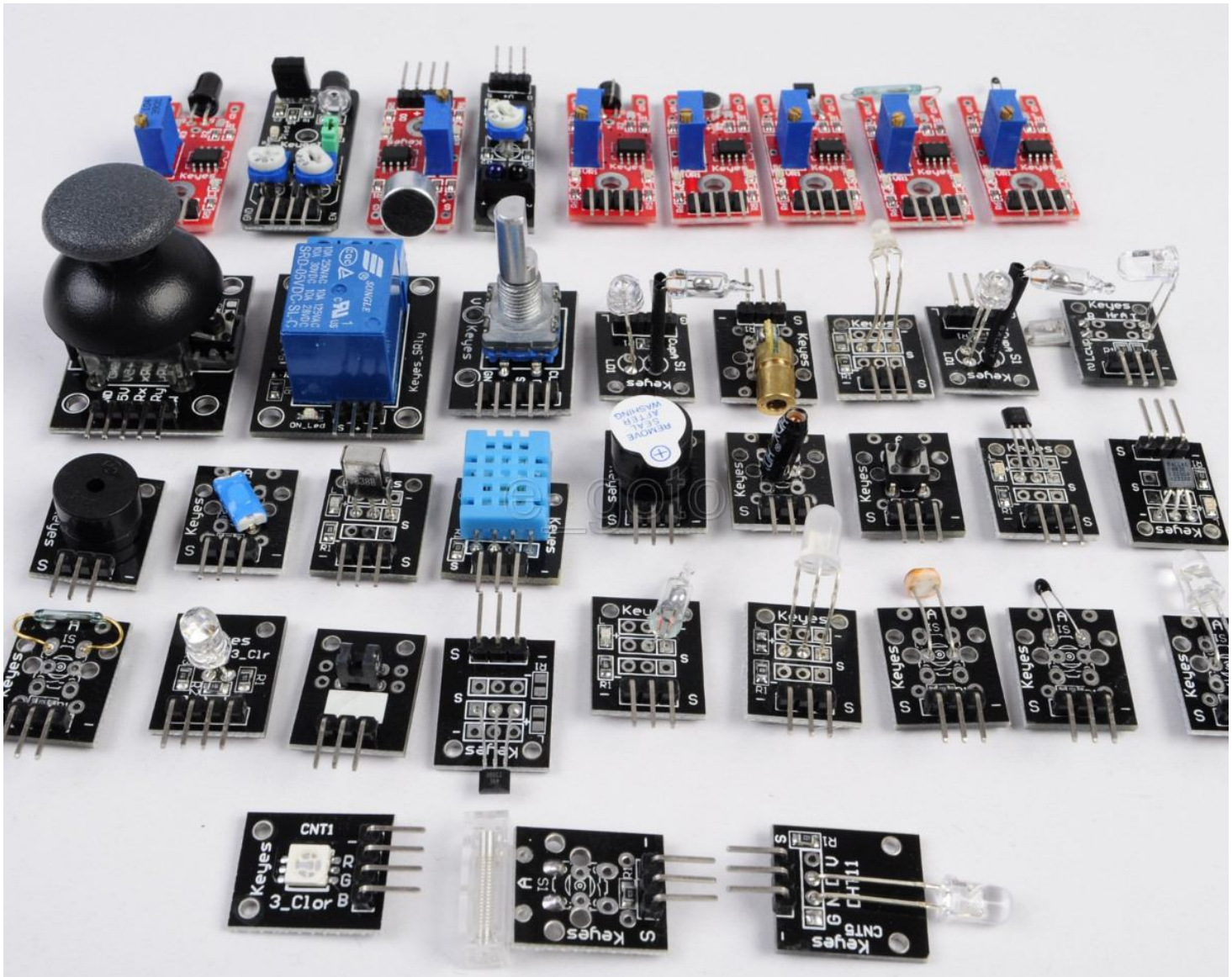
Sensores



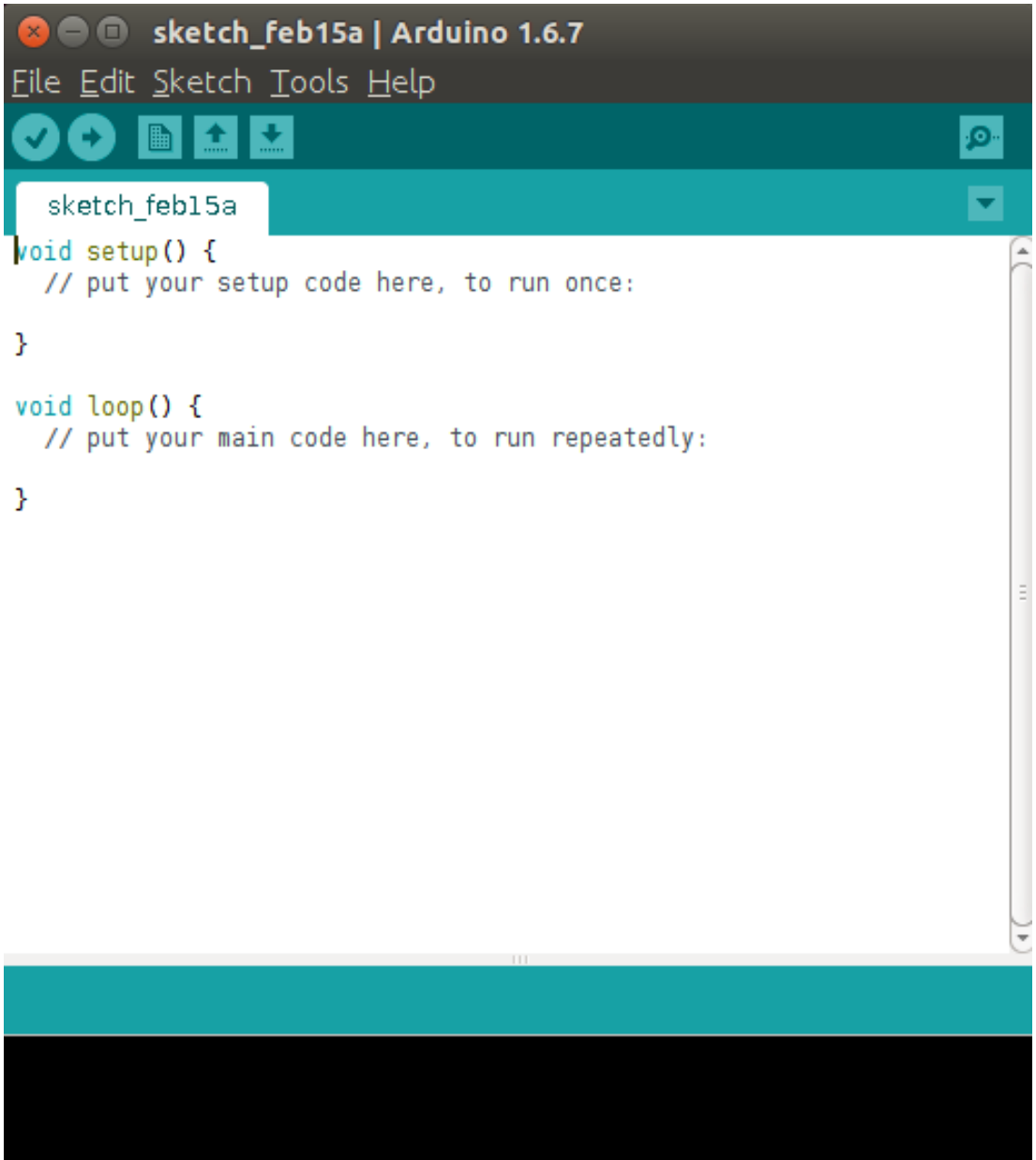


Kits

Kits...



Sketch

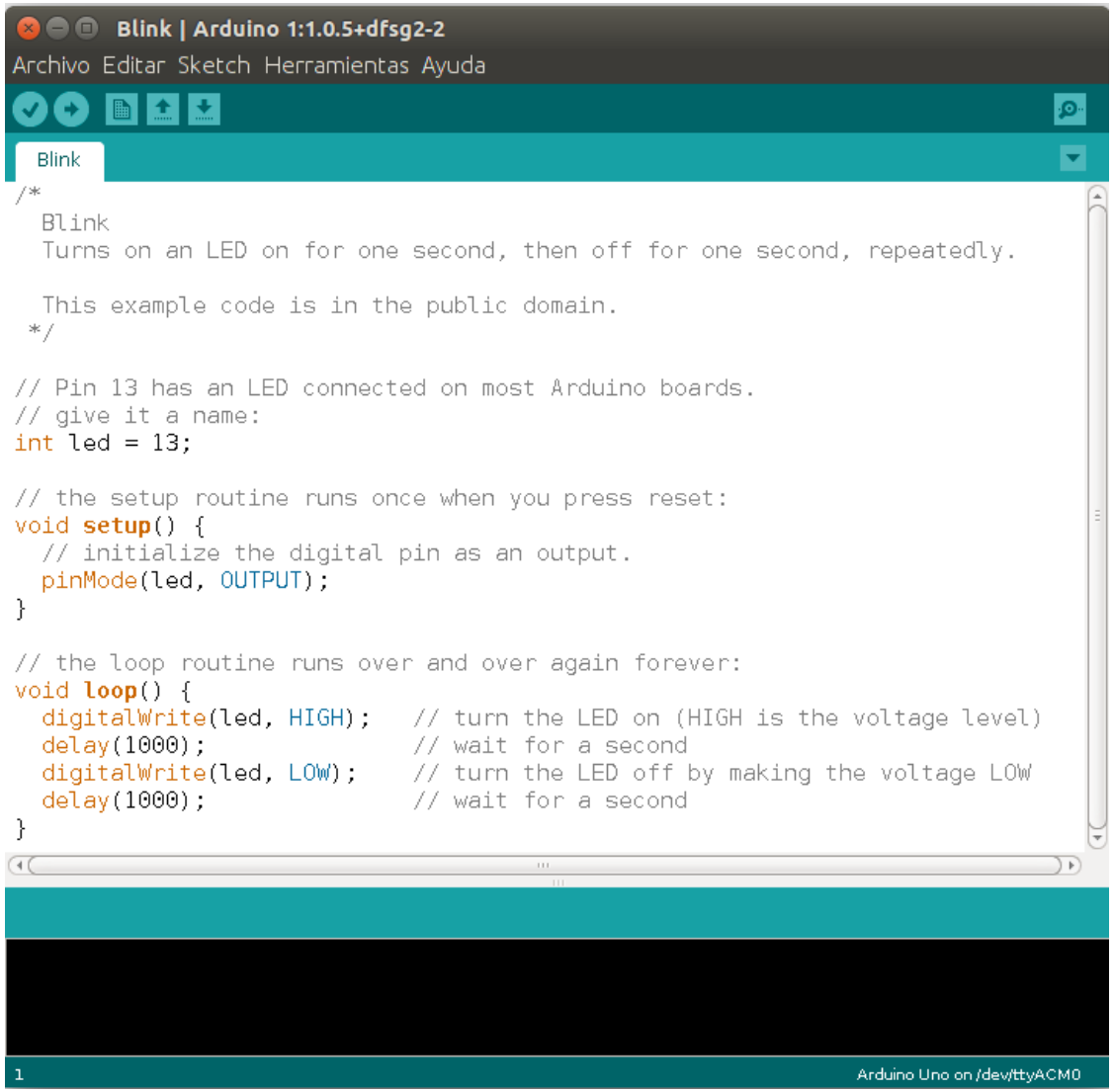

sketch_feb15a | Arduino 1.6.7
File Edit Sketch Tools Help
sketch_feb15a
void setup() {
// put your setup code here, to run once:
}
void loop() {
// put your main code here, to run repeatedly:
}

Sketch

Funciones principales:

- setup()
  Configuración inicial: selección de pines, sensores, formatos, velocidades, etc.
- loop()
  Rutina principal, que se ejecuta constantemente
- Fuertemente orientada a interrupciones, por el tipo de uso y por hardware disponible.

Blink



File –> Examples

BLINK: prender y apagar un led por un segundo

Configuración de Pines

Modo del Pin

```
pinMode(pin, mode)
// mode: OUTPUT, INPUT or INPUT_PULLUP
```

Interrupciones

```
attachInterrupt(digitalPinToInterrupt(pin), ISR, mode)
// mode: LOW, CHANGE, RISING, FALLING
```

Blink

Blink

Blink usando Interrupciones

Tarea

Hacerse una cuenta en en https://123d.circuits.io/

¿Preguntas?