



# Curso de Formación: Introducción al hardware libre: Arduino

Curso 2013/14

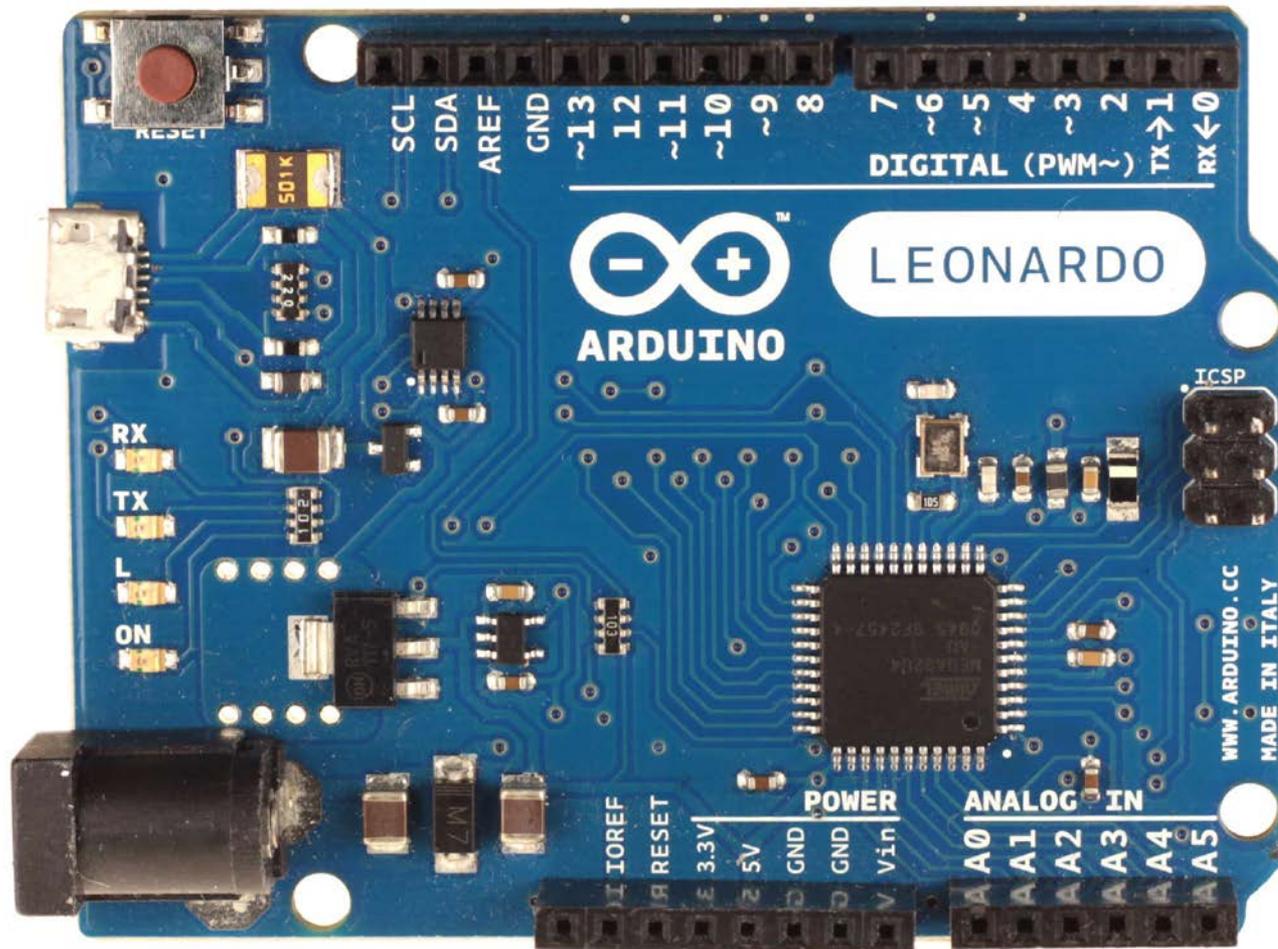
## Formadores:

- Manuel Palomo Duarte
- Arturo Morgado Estévez

Introducción al hardware de Arduino

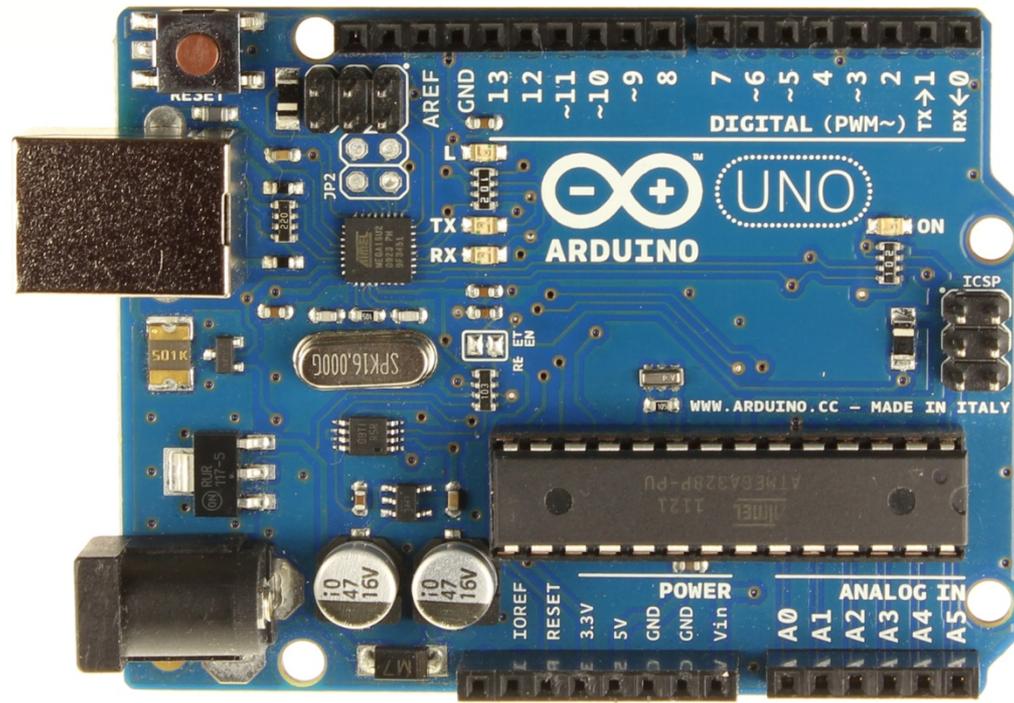
# INTRODUCCIÓN A ARDUINO

- Página oficial de Arduino.
  - <http://www.arduino.cc/>



# INTRODUCCIÓN A ARDUINO

- Hardware Arduino.
  - Hardware libre. Arduino es una plataforma de electrónica abierta para la creación de prototipos basada en software y hardware flexibles y fáciles de usar.



# INTRODUCCIÓN A ARDUINO

- Página de descarga entorno Arduino.  
<http://arduino.cc/en/Main/Software>



## Arduino IDE

### Arduino 1.0.5

#### Download

Arduino 1.0.5 (release notes), hosted by Google Code:

- Windows Installer, Windows (ZIP file)
- Mac OS X
- Linux: 32 bit, 64 bit
- source

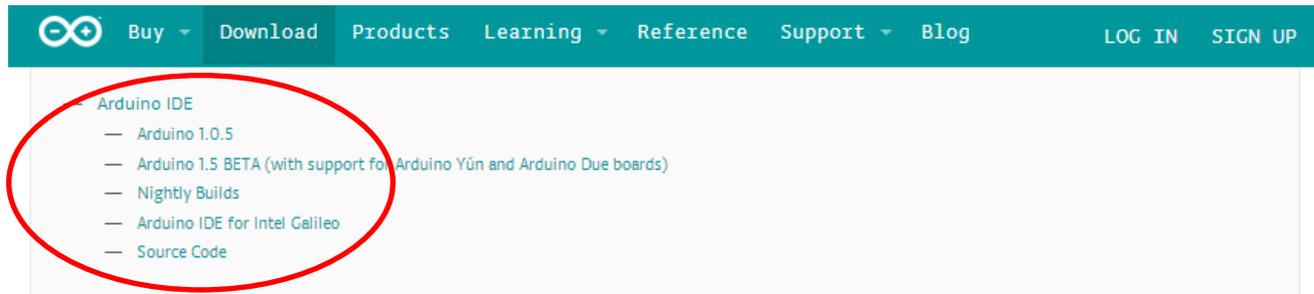
#### Next steps

- Getting Started
- Reference
- Environment
- Examples
- Foundations
- FAQ

Arduino 1.5 BETA (with support for Arduino Yún and Arduino Due boards)

# INTRODUCCIÓN A ARDUINO

- Descarga del entorno de trabajo.
  - <http://arduino.cc/en/Main/Software>



## Arduino IDE

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#### Next steps

- Getting Started
- Reference
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Arduino 1.5 BETA (with support for Arduino Yún and Arduino Due boards)

# INTRODUCCIÓN A ARDUINO

- Hardware Arduino.
  - Modelos de placas.



Arduino Uno



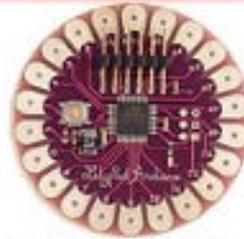
Arduino Leonardo



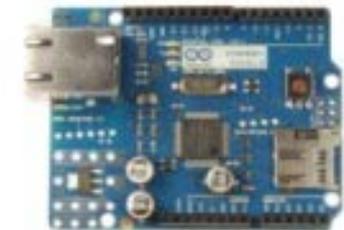
Arduino WiFi Shield



Arduino Mega 2560



Arduino LilyPad



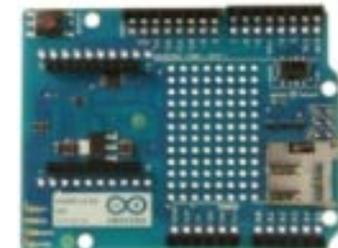
Arduino Ethernet Shield



Arduino Mega ADK



Arduino Fio



Arduino Wireless SD Shield

# INTRODUCCIÓN A ARDUINO

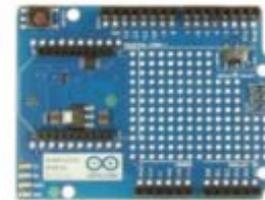
- Hardware Arduino.
  - Modelos de placas.



Arduino Ethernet



Arduino Pro



Arduino Wireless Proto Shield



Arduino BT



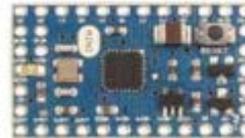
Arduino Nano



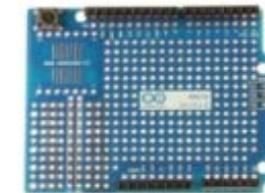
Arduino Motor Shield



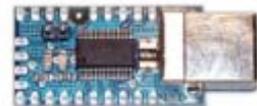
USB/Serial Light Adapter



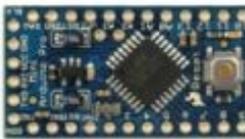
Arduino Mini



Arduino Proto Shield



Mini USB/Serial Adapter



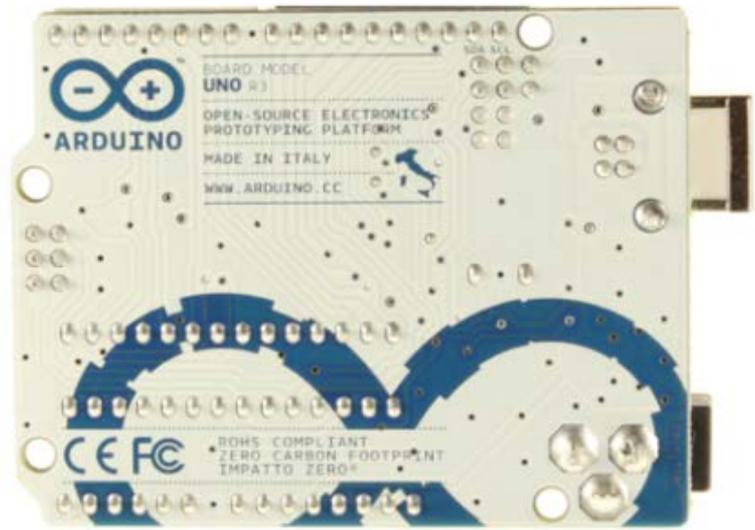
Arduino Pro Mini

# INTRODUCCIÓN A ARDUINO

- Hardware Arduino.
  - Placa Arduino Uno.



*Arduino Uno R3 Front*



*Arduino Uno R3 Back*



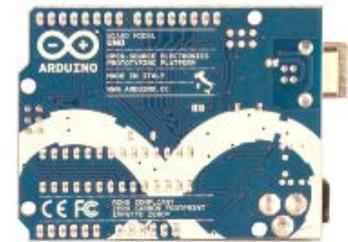
*Arduino Uno R2 Front*



*Arduino Uno SMD*



*Arduino Uno Front*



*Arduino Uno Back*

# INTRODUCCIÓN A ARDUINO

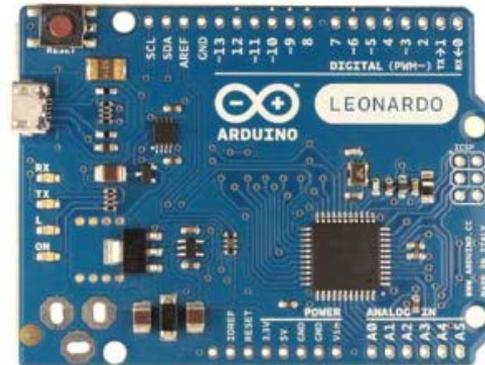
- Hardware Arduino.
  - Placa Arduino Leonardo.



*Arduino Leonardo Front with headers*



*Arduino Leonardo Rear*



*Arduino Leonardo Front without headers*

# INTRODUCCIÓN A ARDUINO

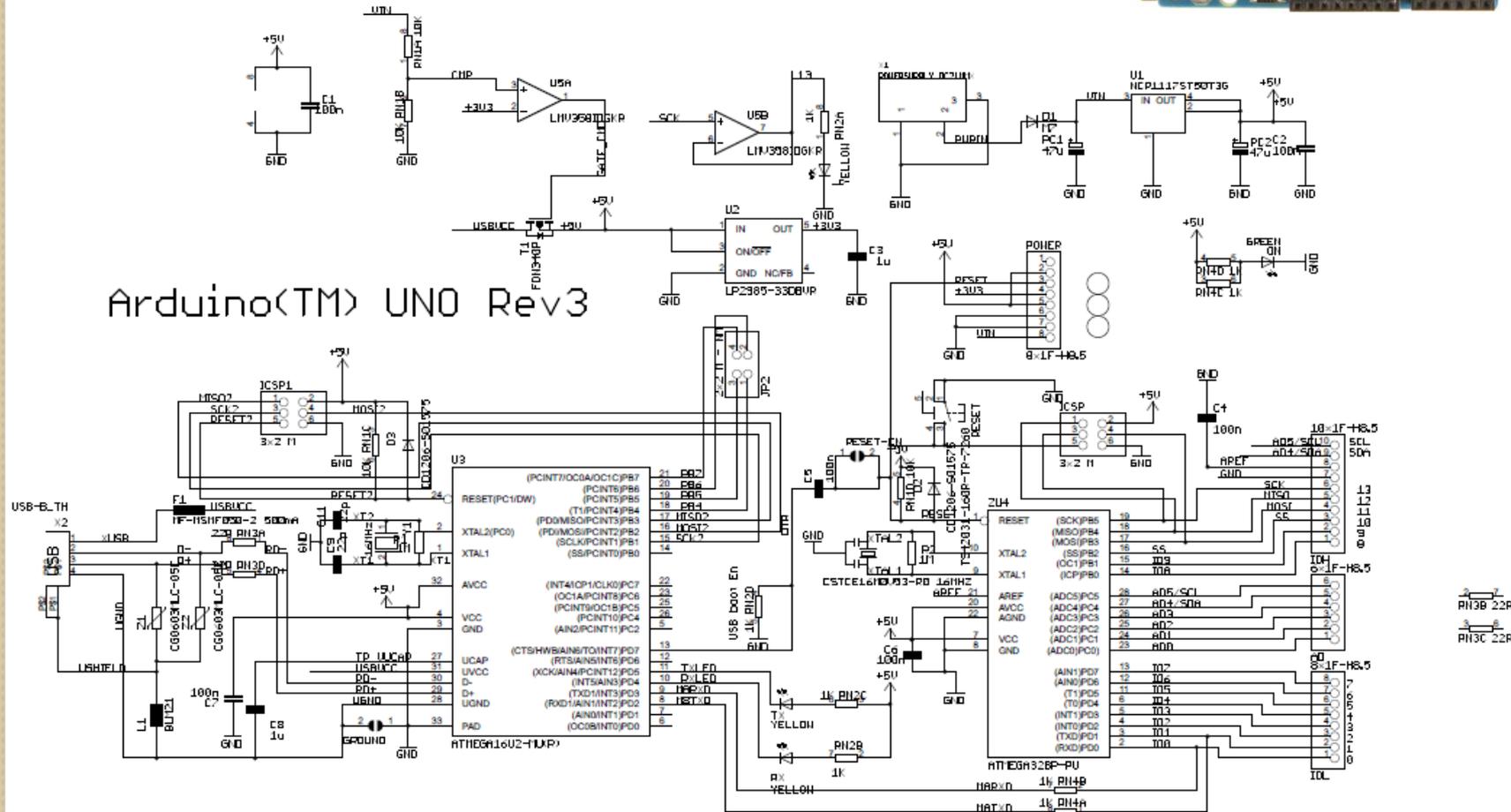
- Hardware Arduino.
  - Características placas Arduino Uno y Arduino Leonardo.

	Arduino Uno	Arduino Leonardo
Microcontroller	ATmega328	ATmega32u4
Operating Voltage	5V	5V
Input Voltage (recommended)	7-12V	7-12V
Input Voltage (limits)	6-20V	6-20V
Digital I/O Pins	14	20
PWM Channels	6	7
Analog Input Pins	6	12
DC Current per I/O Pin	40 mA	40 mA
DC Current for 3.3V Pin	50 mA	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by bootloader	32 KB (ATmega32u4) of which 4 KB used by bootloader
SRAM	2 KB (ATmega328)	2.5 KB (ATmega32u4)
EEPROM	1 KB (ATmega328)	1 KB (ATmega32u4)
Clock Speed	16 MHz	16 MHz



# INTRODUCCIÓN A ARDUINO

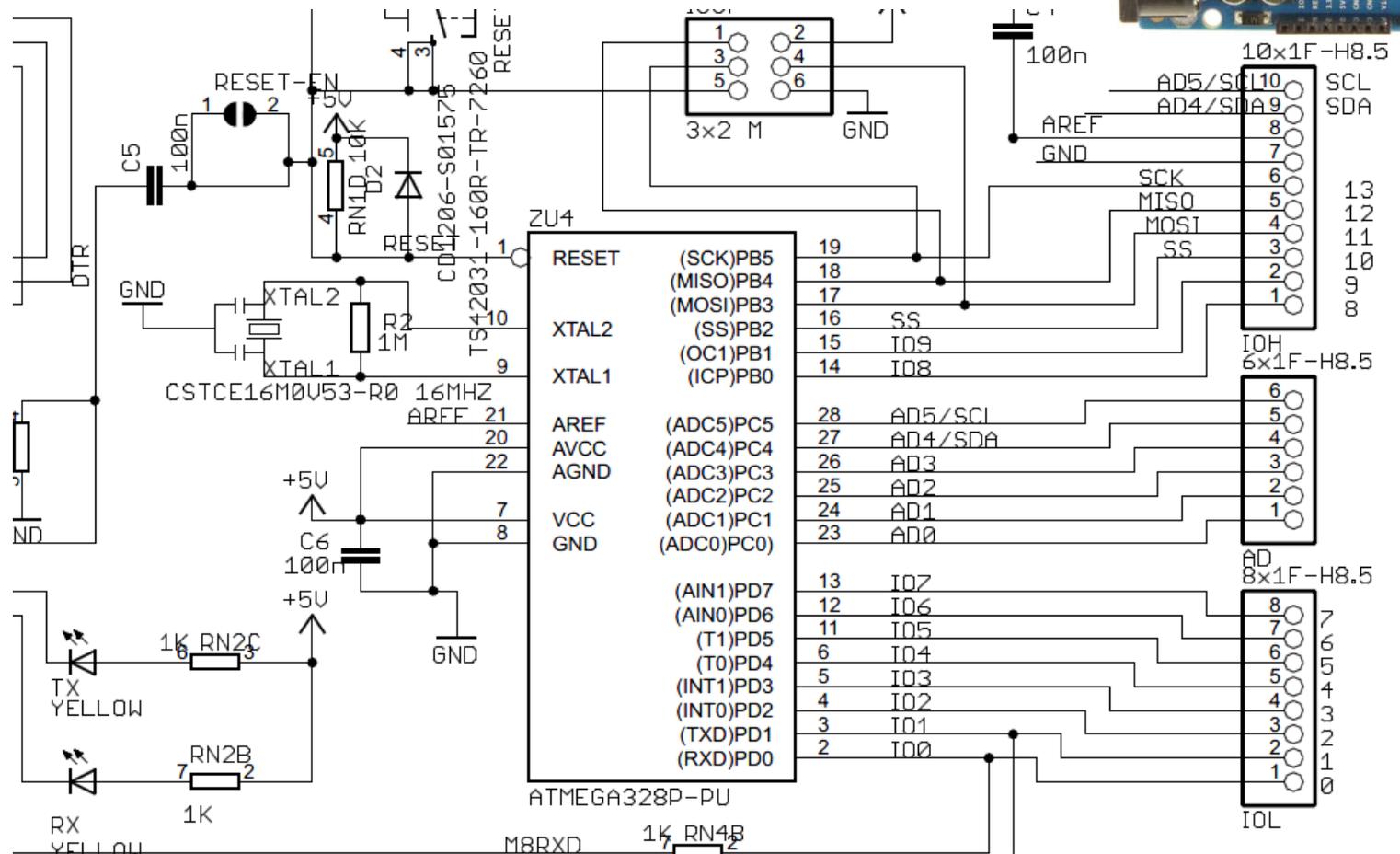
- Hardware Arduino.
  - Esquema Arduino Uno.



R13B 22P  
R13C 22P

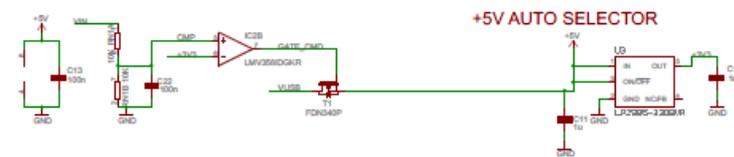
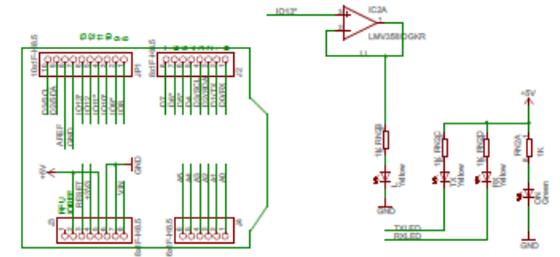
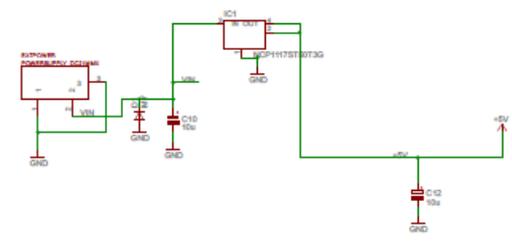
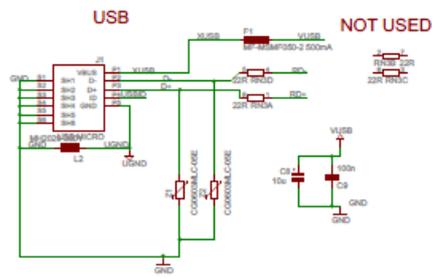
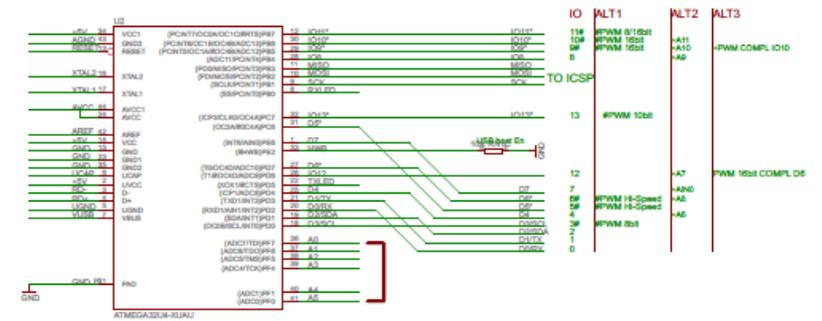
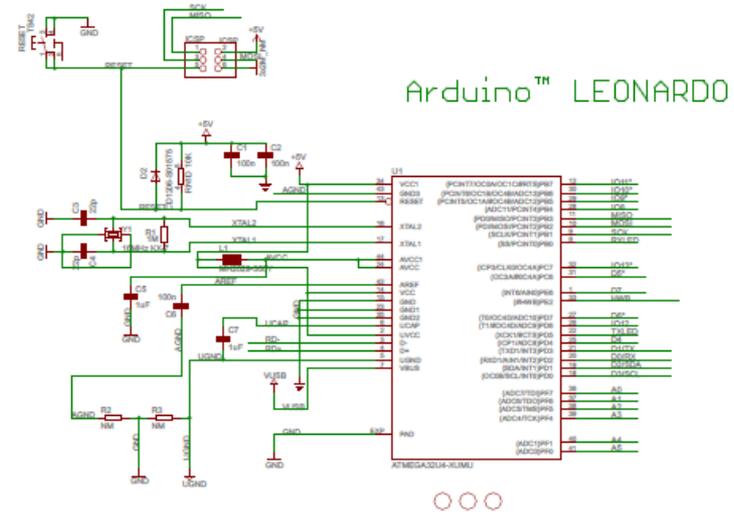
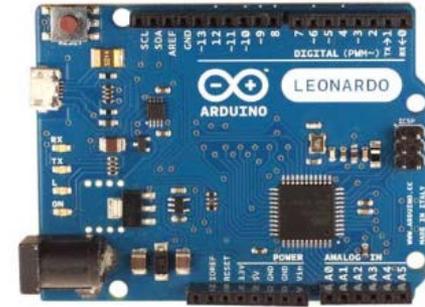
# INTRODUCCIÓN A ARDUINO

- Hardware Arduino.
  - Esquema Arduino Uno.



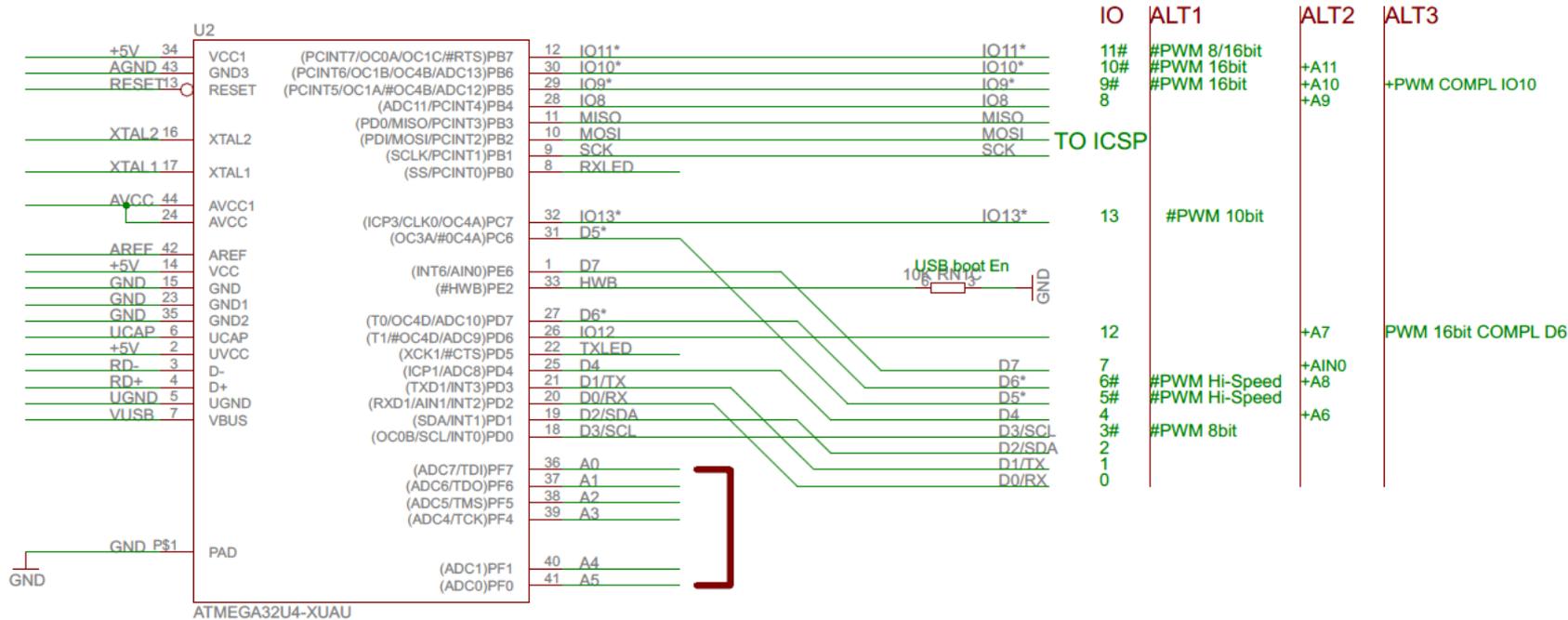
# INTRODUCCIÓN A ARDUINO

- Hardware Arduino.
  - Placa Arduino Leonardo.



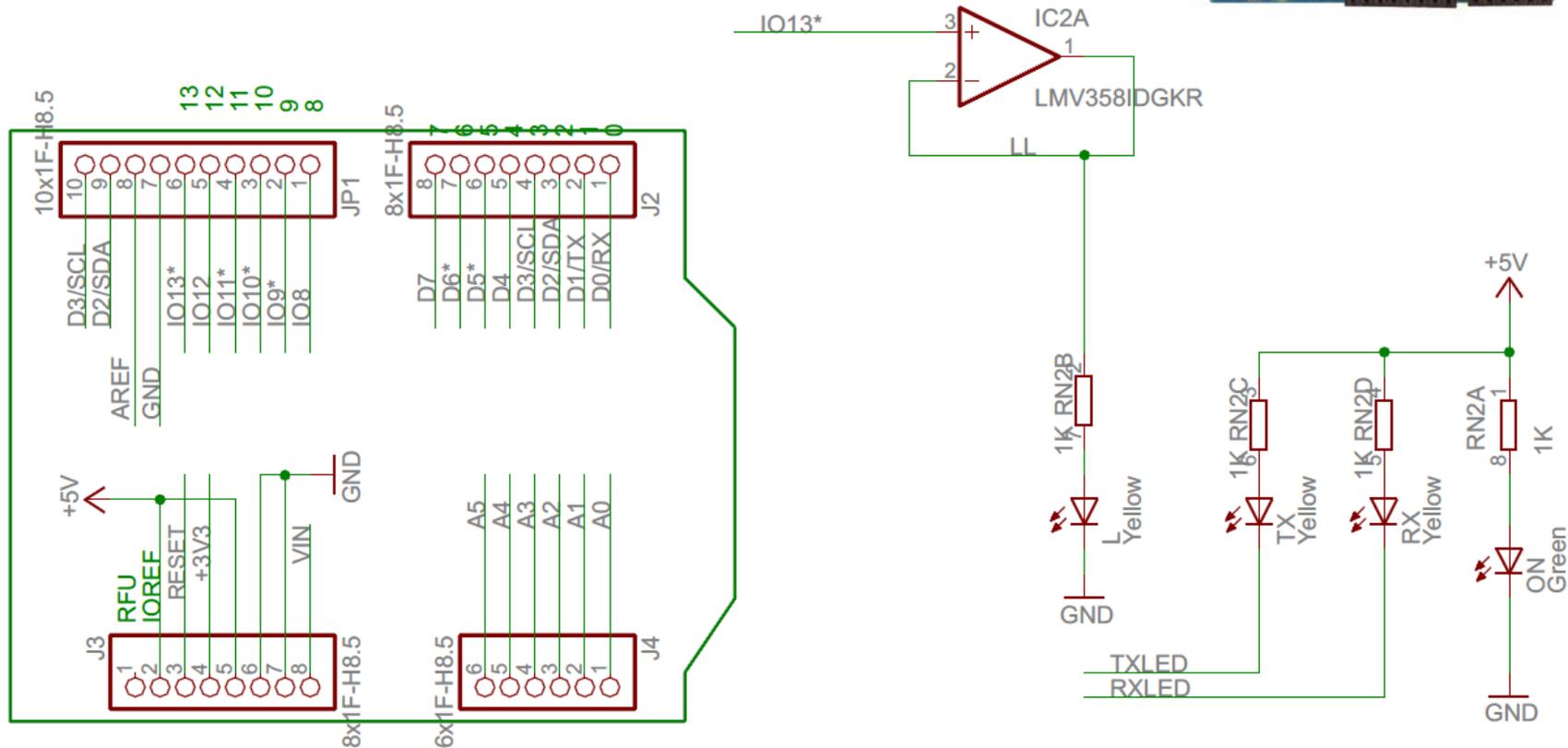
# INTRODUCCIÓN A ARDUINO

- Hardware Arduino.
  - Placa Arduino Leonardo.



# INTRODUCCIÓN A ARDUINO

- Hardware Arduino.
  - Placa Arduino Leonardo.



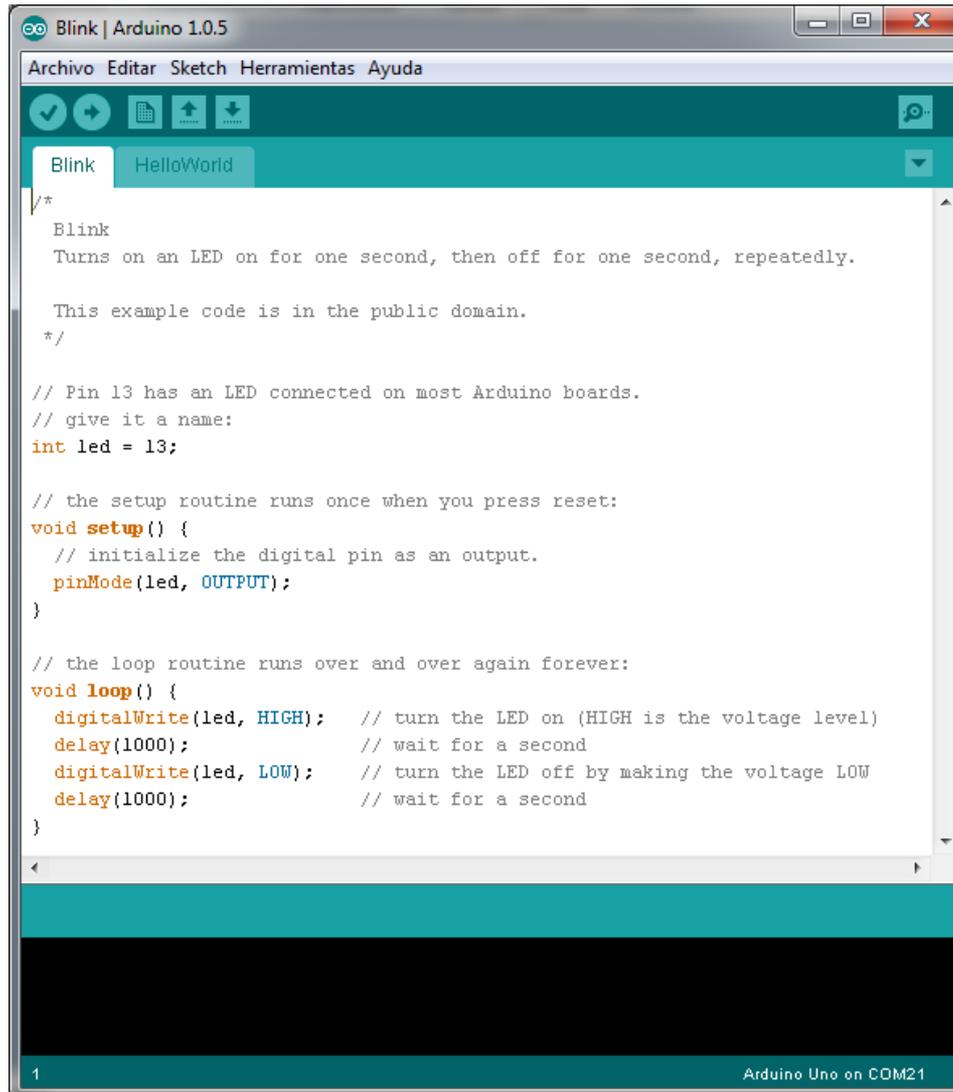
# INTRODUCCIÓN A ARDUINO

- Descarga del entorno de trabajo.
  - <http://arduino.cc/en/Main/Software>

Nombre	Tamaño
drivers	
examples	
hardware	
java	
lib	
libraries	
reference	
tools	
 arduino.exe	840 KB
 cygconv-2.dll	947 KB
 cygwin1.dll	1.829 KB
 libusb0.dll	43 KB
 revisions.txt	38 KB
 rxtxSerial.dll	76 KB
 uninstall.exe	402 KB

# INTRODUCCIÓN A ARDUINO

- Sketch de Arduino.



The screenshot shows the Arduino IDE interface with the 'Blink' sketch loaded. The code is as follows:

```
Blink | Arduino 1.0.5
Archivo  Editar  Sketch  Herramientas  Ayuda

Blink  HelloWorld

/*
  Blink
  Turns on an LED on for one second, then off for one second, repeatedly.

  This example code is in the public domain.
  */

// Pin 13 has an LED connected on most Arduino boards.
// give it a name:
int led = 13;

// the setup routine runs once when you press reset:
void setup() {
  // initialize the digital pin as an output.
  pinMode(led, OUTPUT);
}

// the loop routine runs over and over again forever:
void loop() {
  digitalWrite(led, HIGH); // turn the LED on (HIGH is the voltage level)
  delay(1000);             // wait for a second
  digitalWrite(led, LOW);  // turn the LED off by making the voltage LOW
  delay(1000);             // wait for a second
}

1
Arduino Uno on COM21
```



# INTRODUCCIÓN A ARDUINO

- Sensores y actuadores.

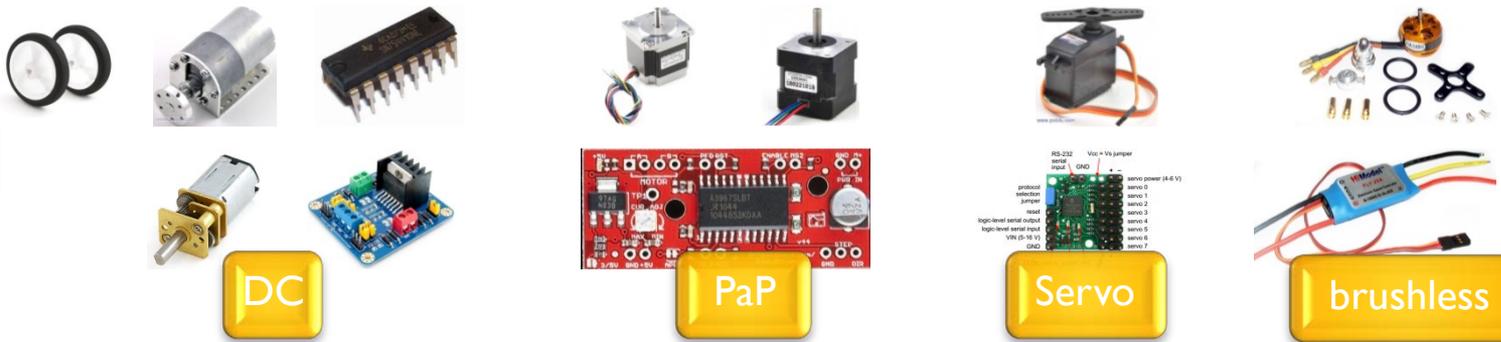
- 2.- La Electrónica.

- Sensores y actuadores. Ahora hay que conectarlos. Conocimiento de electrónica.  
**Buscar en Internet cómo se conectan.** Comunidades (Arduino)

Sensores



Actuadores



DC

PaP

Servo

brushless