

Introduction to Arduino

by Barry van Kampen
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Who?

- Fish_ aka Barry?
- Proud to be a Nerd at ITQ
- Founder of Randomdata
- HiTB 2010 Amsterdam
- 0xThinker!
- The sky is NOT the limit



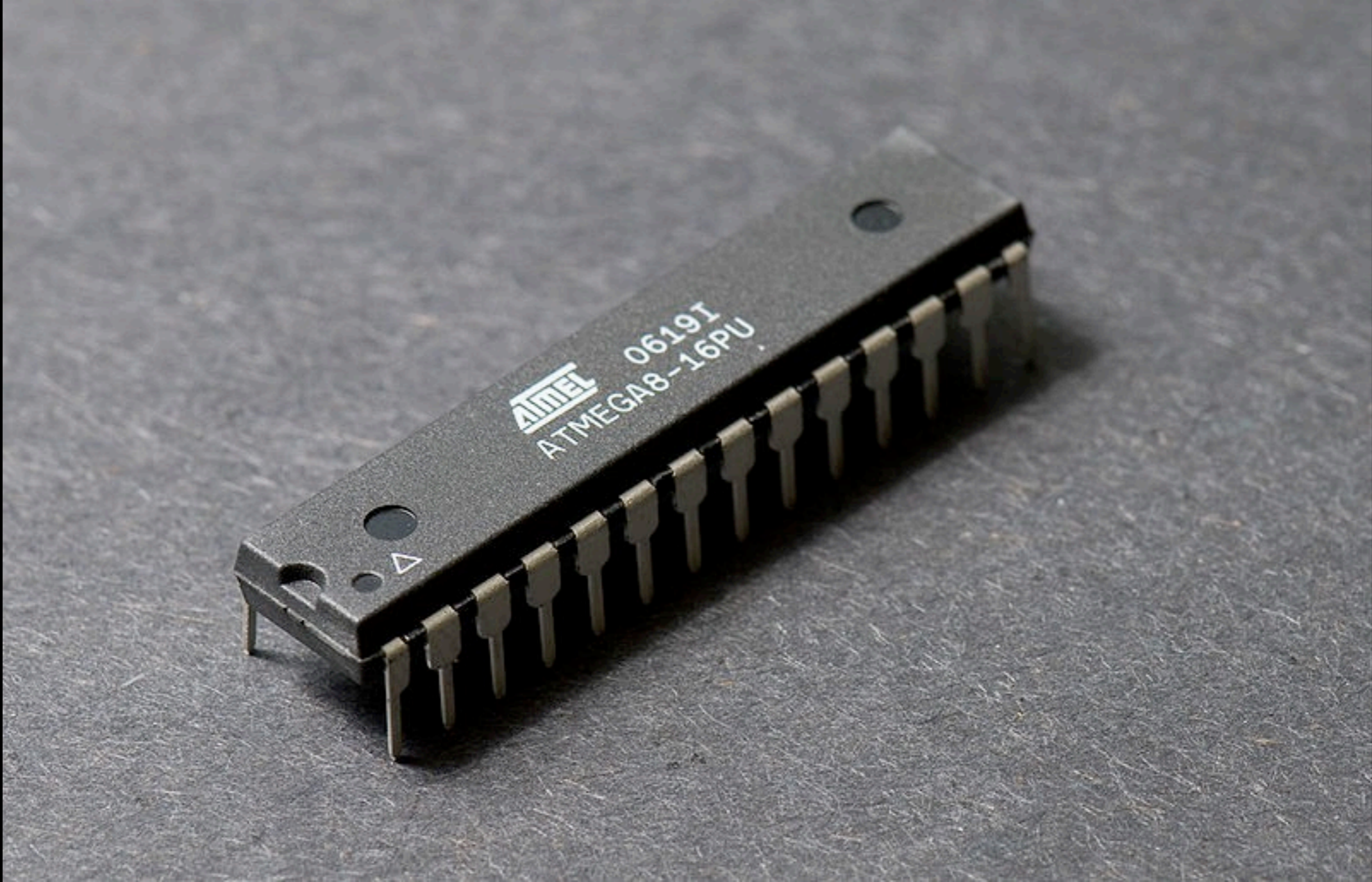
Agenda

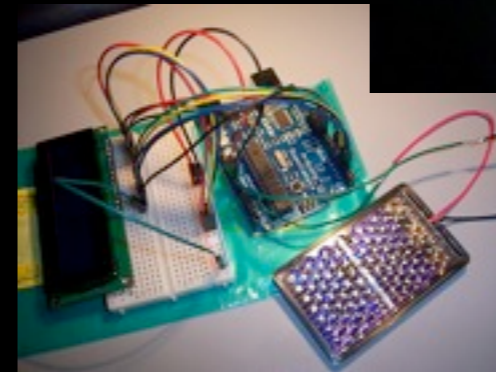
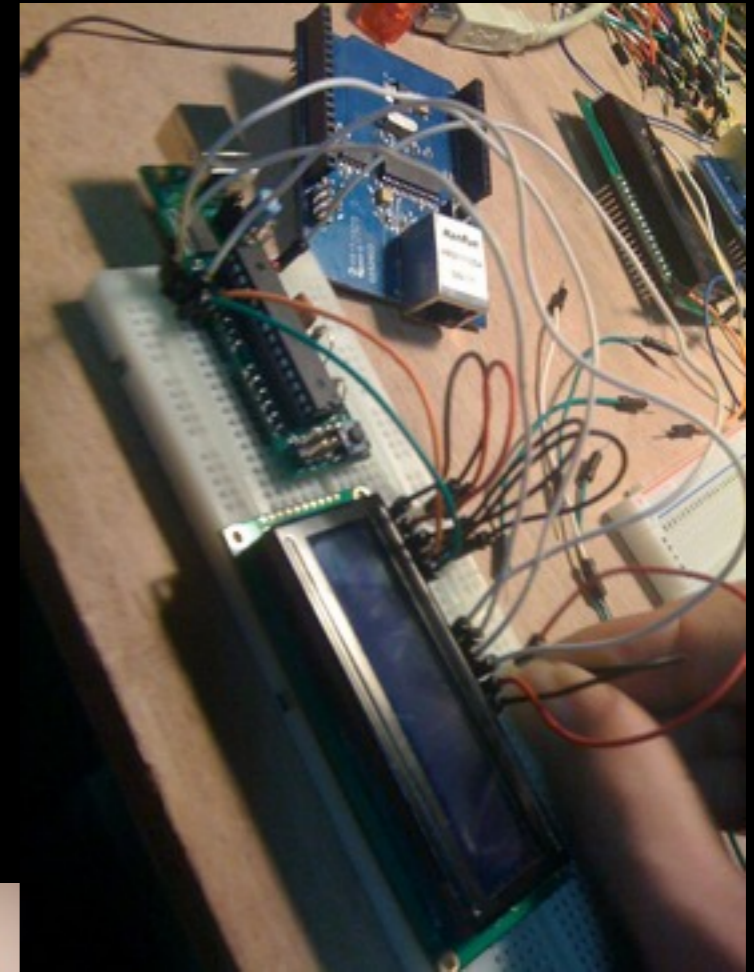
- What you can and what we do
- Introduction to Arduino hardware
- Arduino 1-2-3
- HandsOn!



Experience?



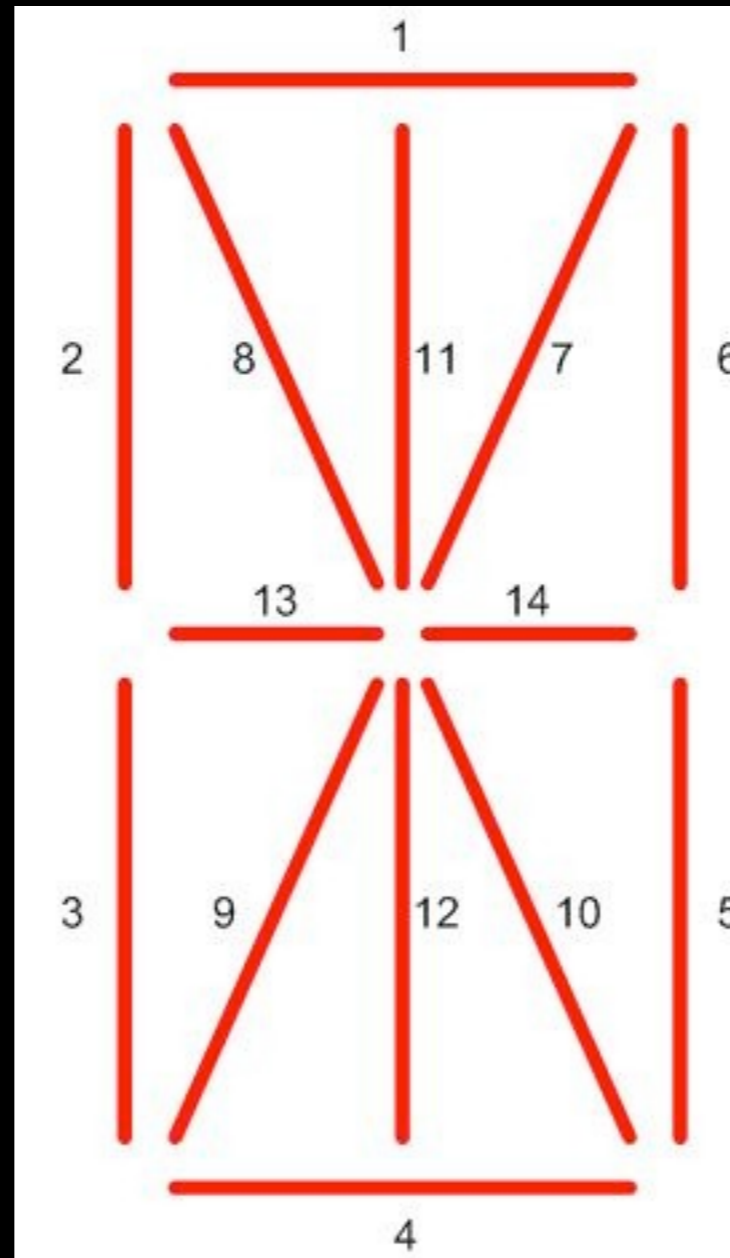




Blinky!



Blinky!



Blinky!

```
/*
 * Blink board at HAR2009, made by Fish, free for use but send me an update or picture.
 */

#include <Ethernet.h>
byte mac[] = { 0x88, 0xED, 0xBE, 0xEF, 0xFE, 0xED }; //the arduino's mac address
byte ip[] = { 87, 76, 53, 182 }; // the arduino's ip address
byte server[] = { 0, 0, 0, 0 }; // ip address of server to get the characters
byte gateway[] = { 87, 76, 52, 1 }; //ip address of the gateway
byte subnet[] = { 255, 255, 254, 0 }; //subnetmask

Client client(server, 80 ); //Define the connect to the webserver

int ledPin1 = 18;           // LED connected to digital pin 1
int ledPin2 = 19;           // LED connected to digital pin 2
int ledPin3 = 2;            // LED connected to digital pin 3
int ledPin4 = 3;            // LED connected to digital pin 4
int ledPin5 = 4;            // LED connected to digital pin 5
int ledPin6 = 5;            // LED connected to digital pin 6
int ledPin7 = 6;            // LED connected to digital pin 7
int ledPin8 = 7;            // LED connected to digital pin 8
int ledPin9 = 8;            // LED connected to digital pin 9
int ledPin10 = 9;           // LED connected to digital pin 10
int ledPin11 = 14;          // LED connected to digital pin 11
int ledPin12 = 15;          // LED connected to digital pin 12
int ledPin13 = 16;          // LED connected to digital pin 13
int ledPin14 = 17;          // LED connected to digital pin 14
int time = 500;             // the time a segment should be on
int timeshort = 200;        //time of lights off
int timebreak = 40;         //time to remove all the lights

void setup()                // run once, when the sketch starts
{
  Ethernet.begin(mac, ip, gateway, subnet); //starting the ethernet
  delay(1000);
  Serial.begin(9600); //for debug you can open a serial connection
}
```



Blinky!

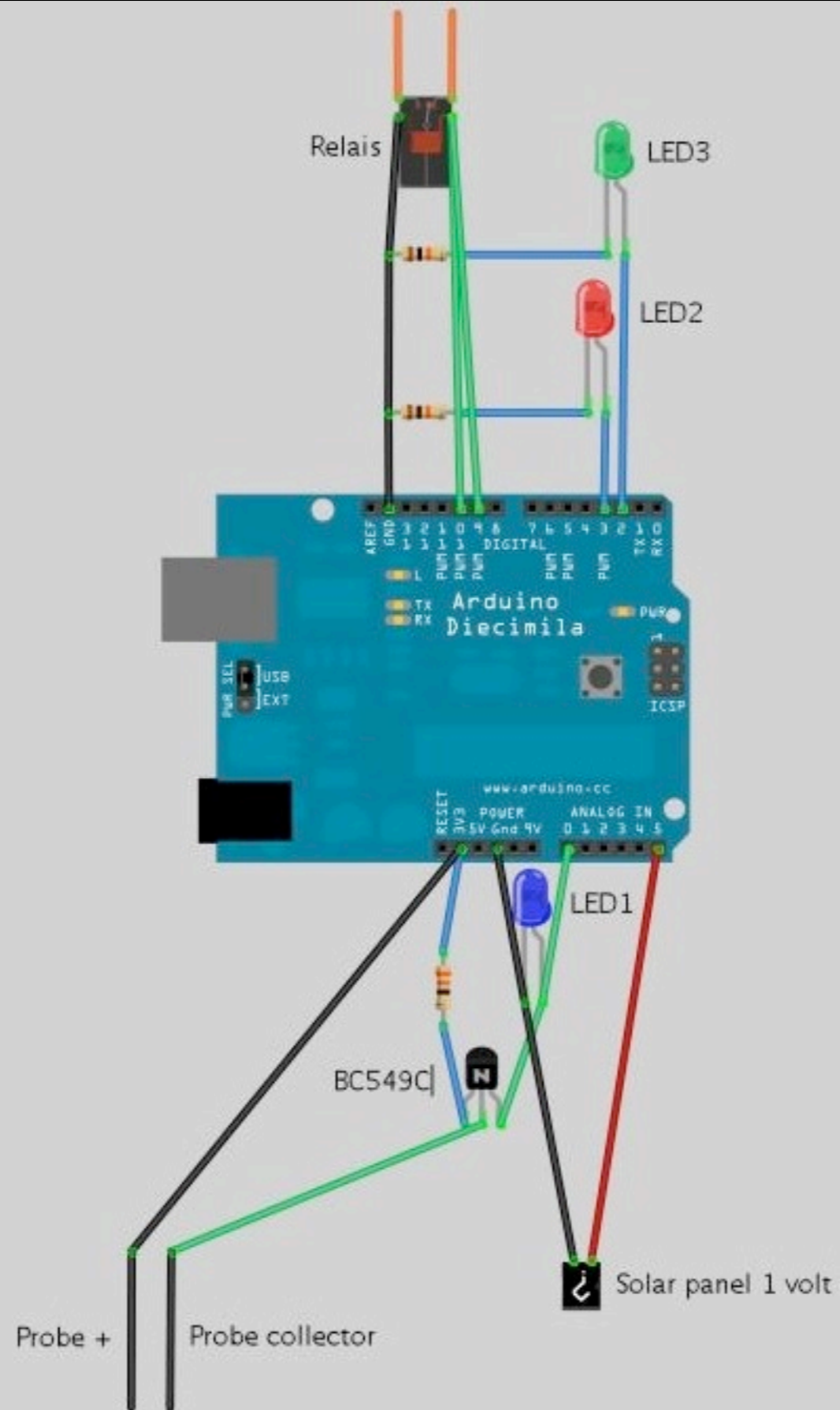
- Website: <http://www.randomdata.nl/blinky/>
- Twitter: <http://www.twitter.com/randomblinky>
- Details & code:

http://www.randomdata.nl/wiki/index.php/Arduino_14_segment_LED_board

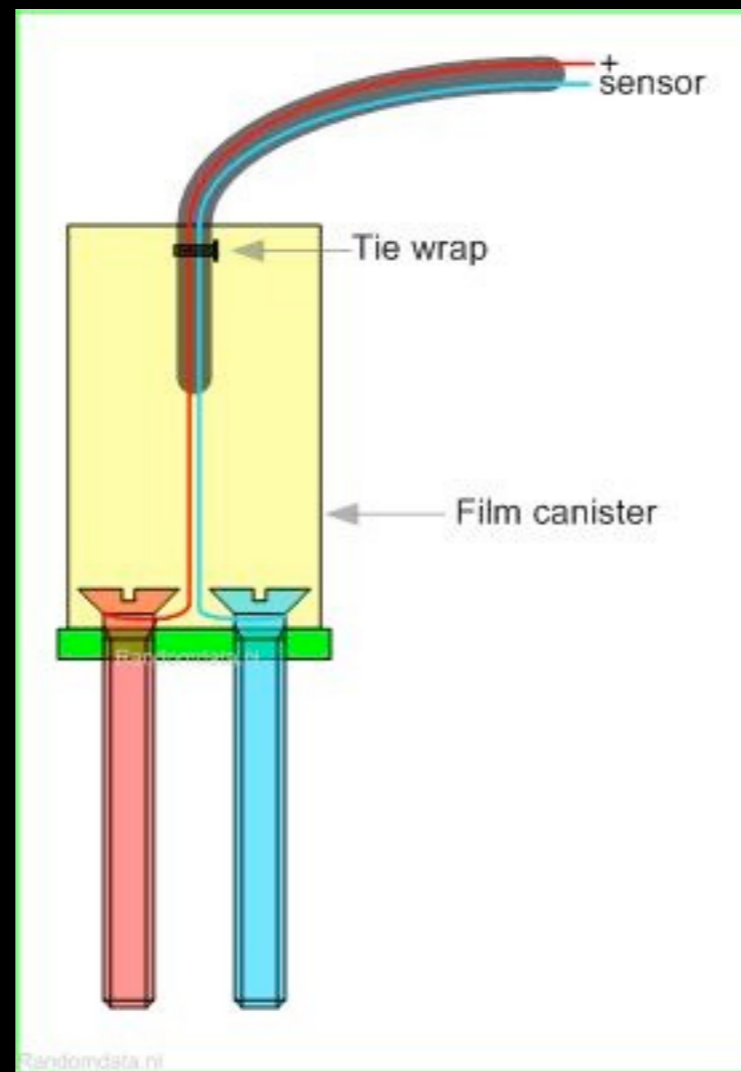


Garduino



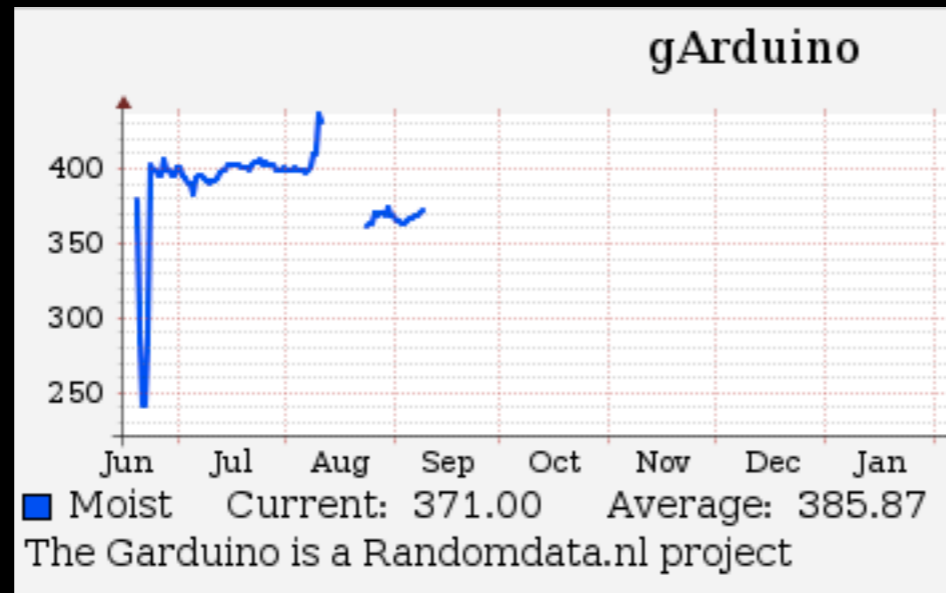


Garduino



Garduino

- Stats:



- Details & code:

<http://www.randomdata.nl/wiki/index.php/Garduino>

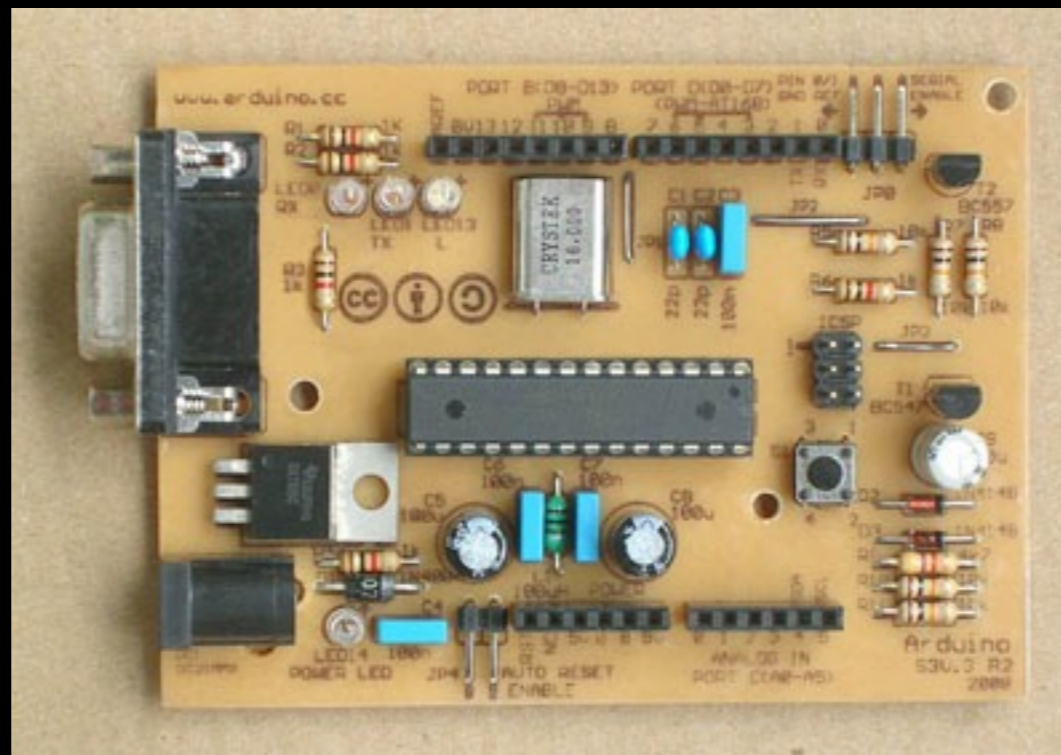


Other projects

- **Blinky 2.0**
- **Garduino extentions**
- **Beer/barduino (Brucon)**
- **Space automation**



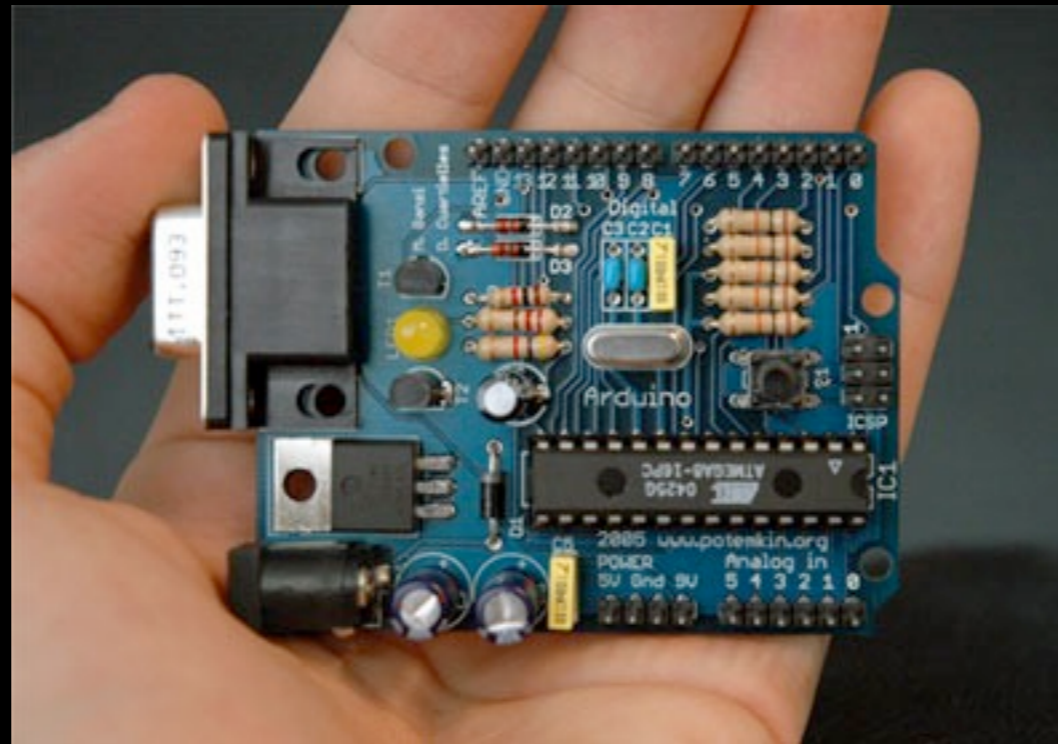
Arduino



The serial single sided



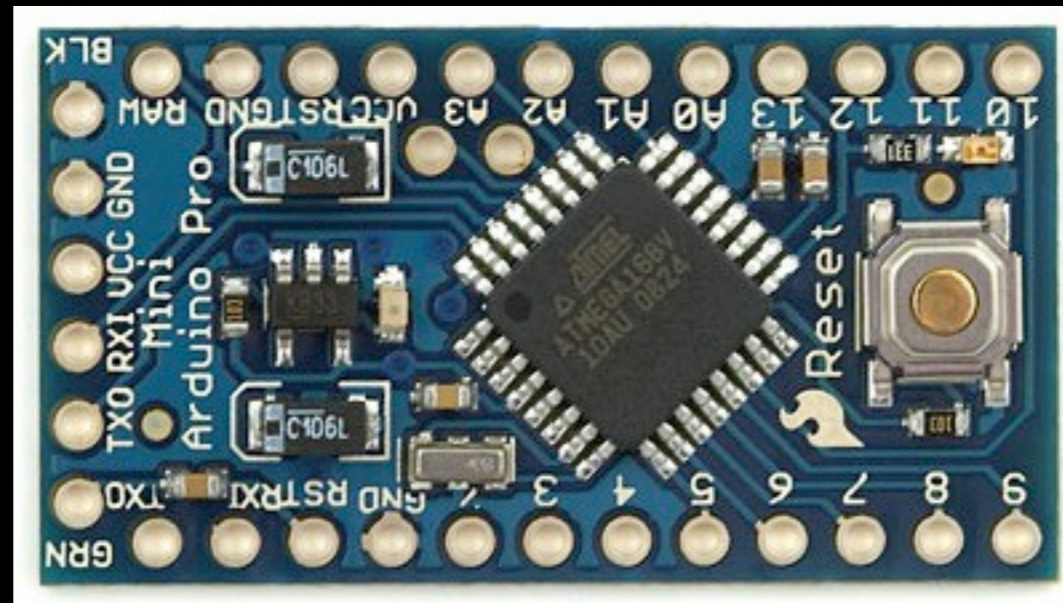
Arduino



The serial



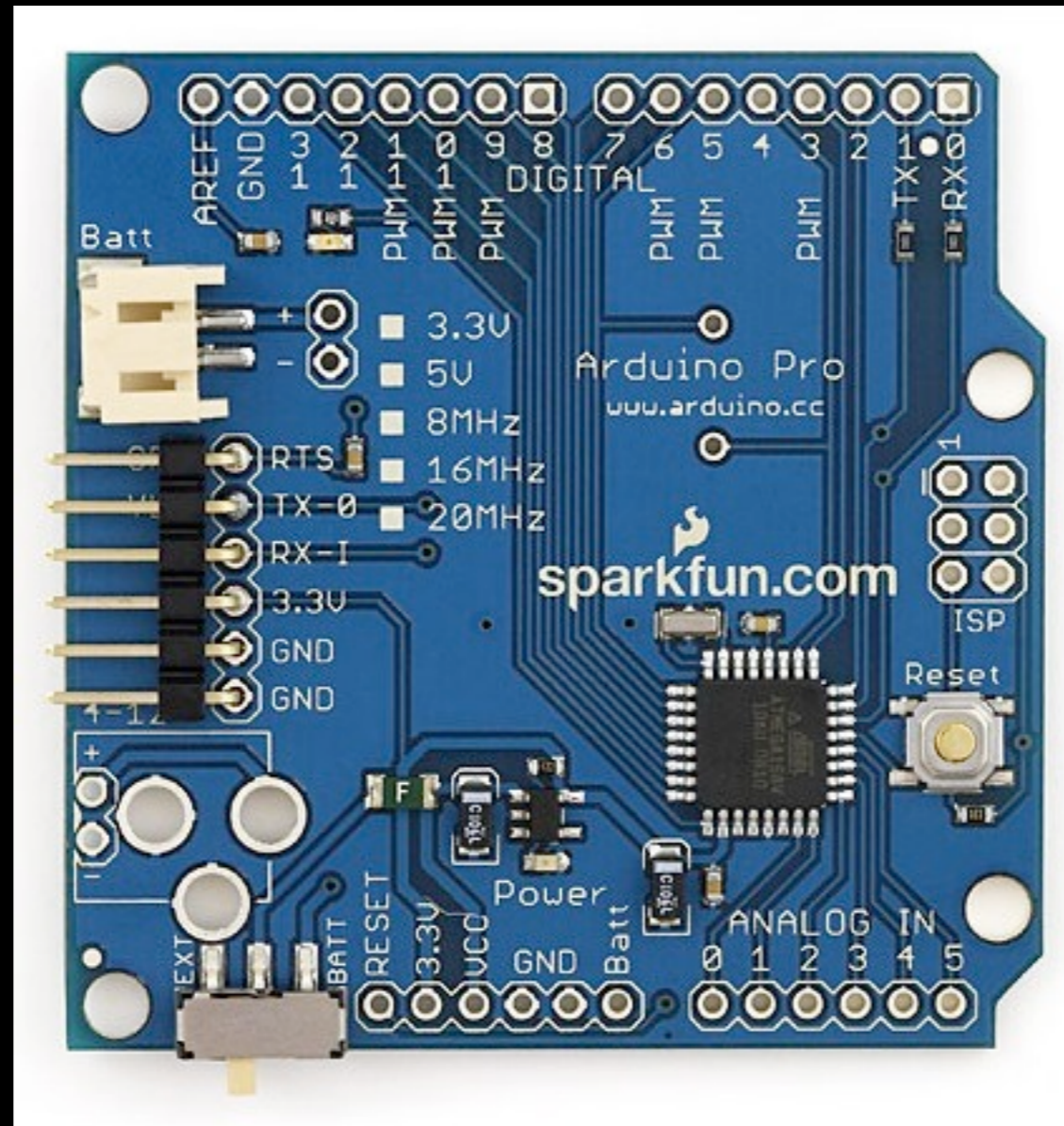
Arduino



The pro mini



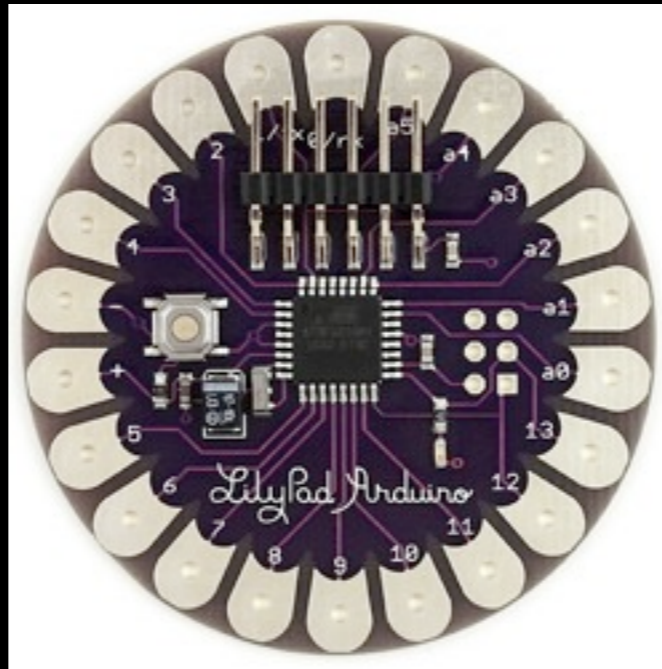
Arduino



The pro



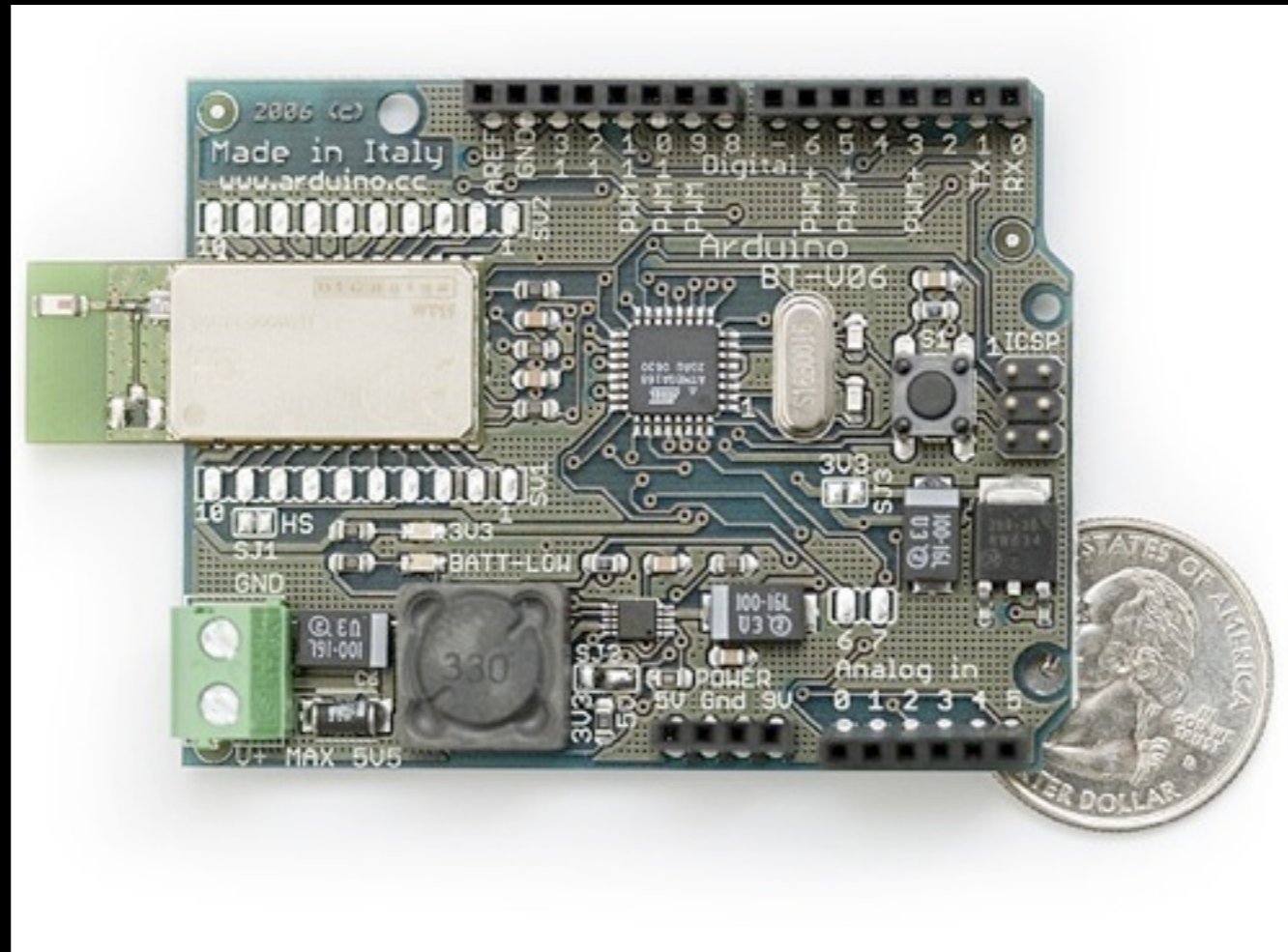
Arduino



The Lilypad



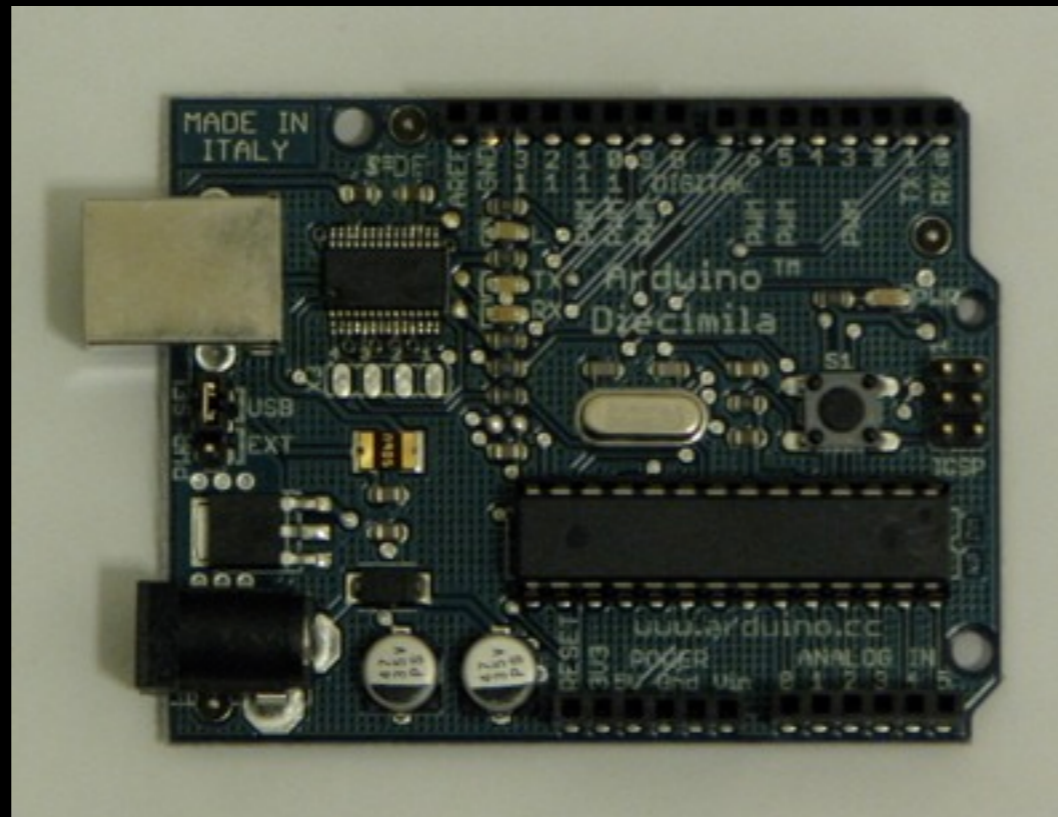
Arduino



Arduino BT



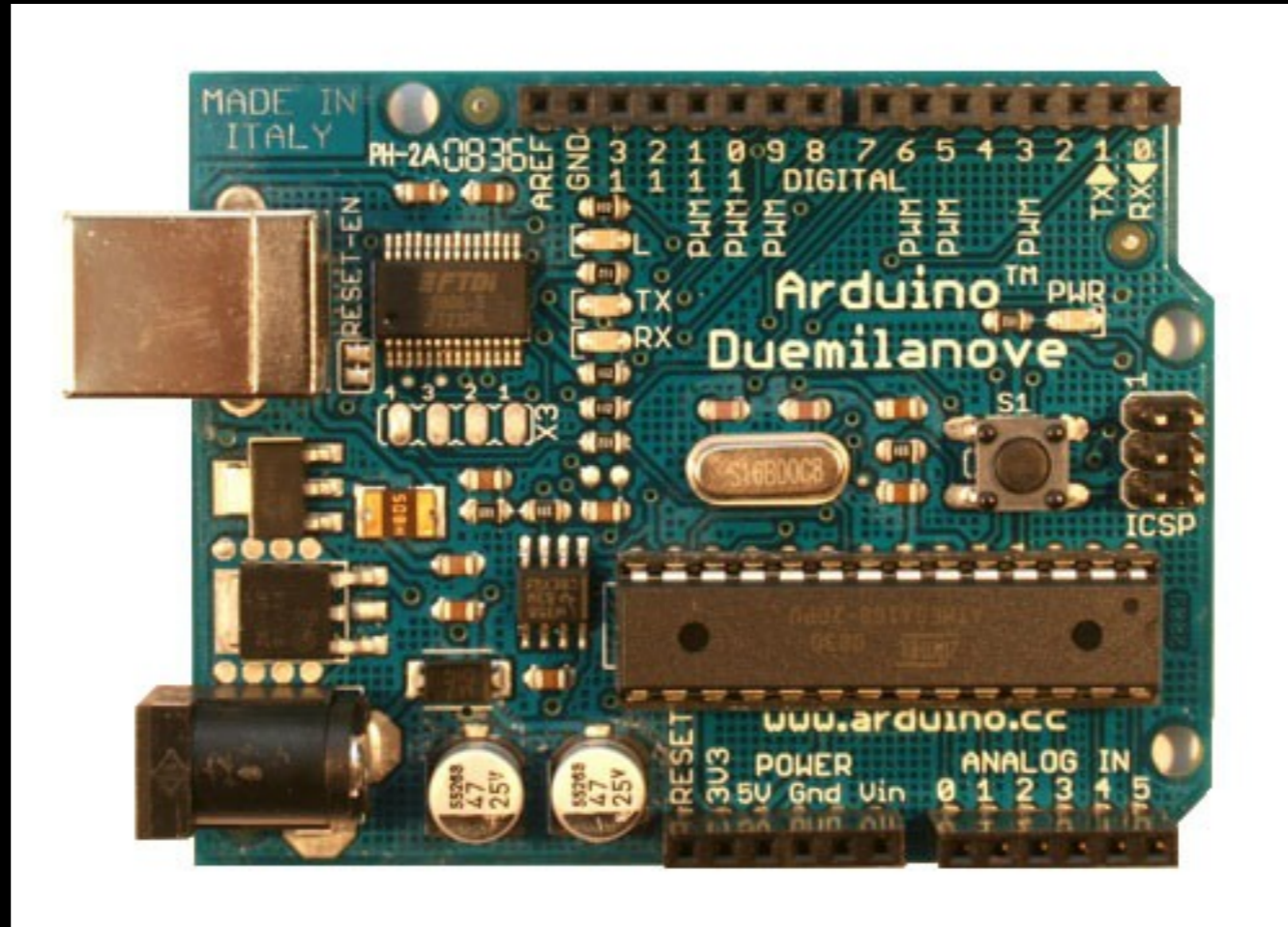
Arduino



The Diecimila



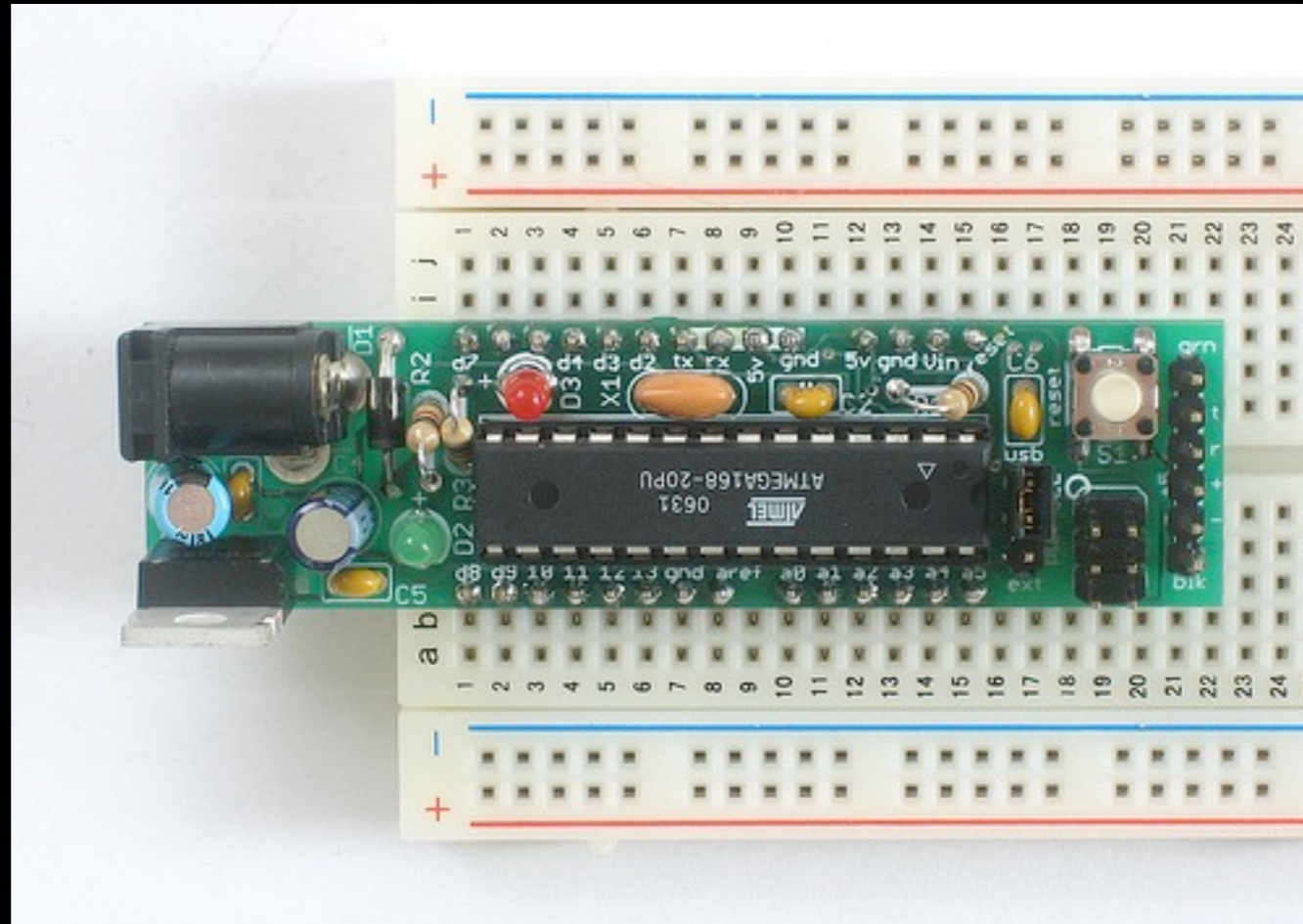
Arduino



The Duemilanove



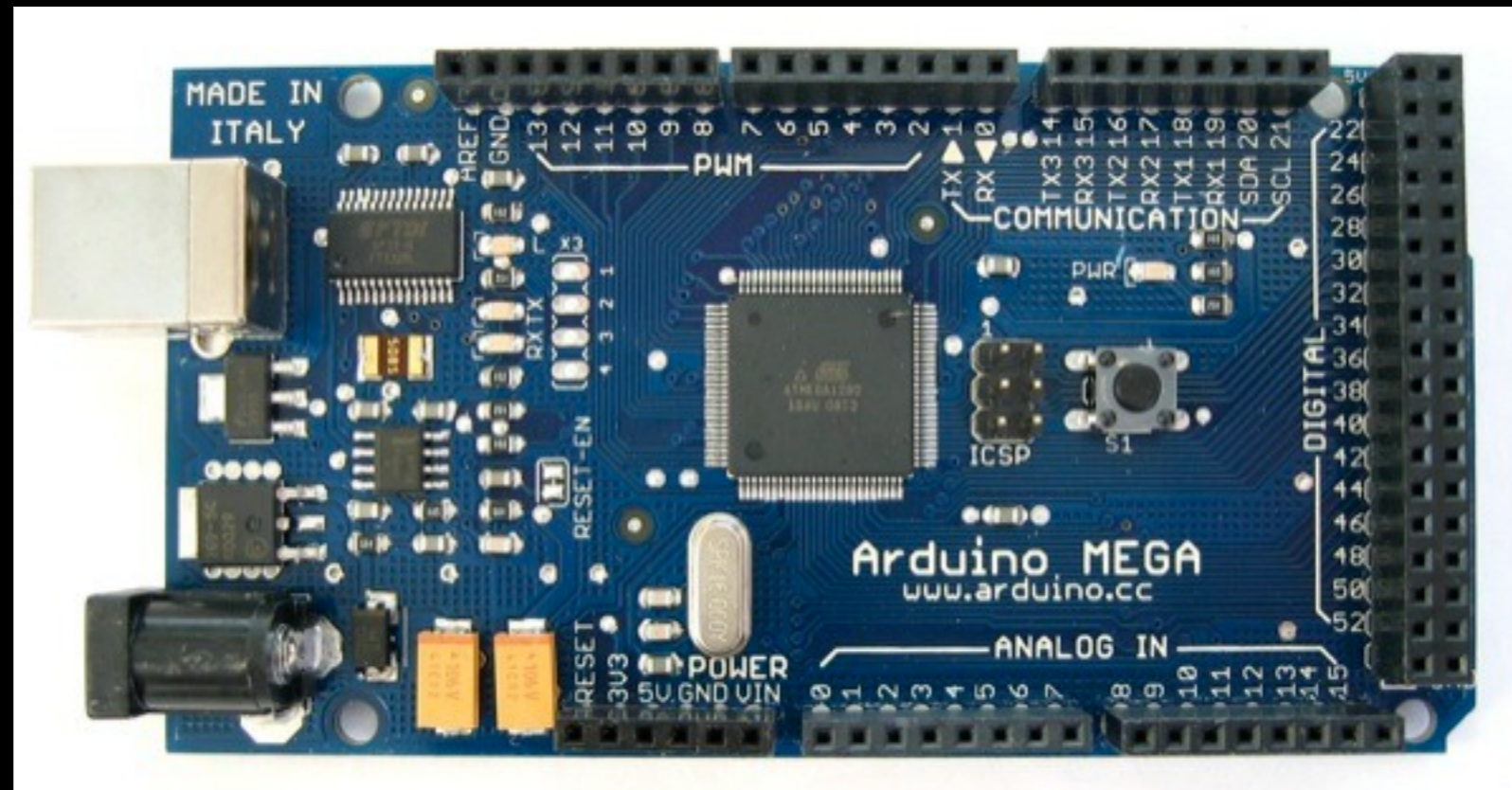
Arduino



The boarduino



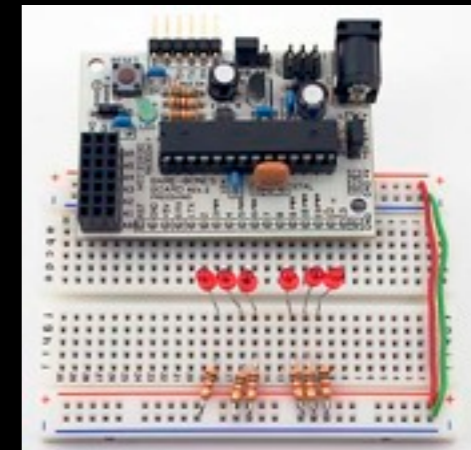
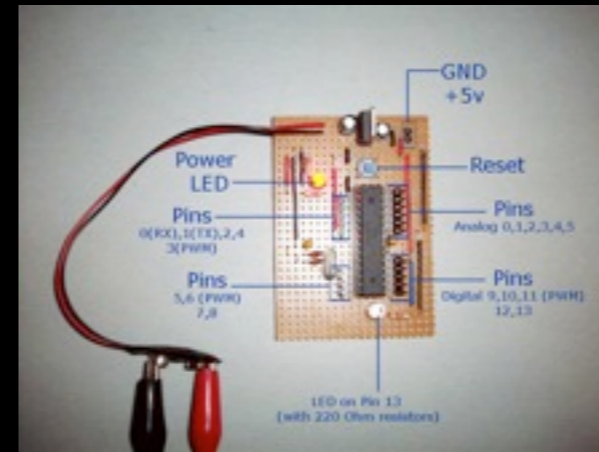
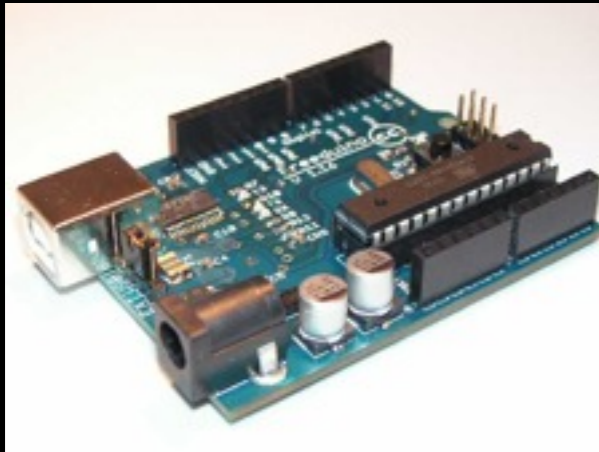
Arduino



The mega



Arduino's

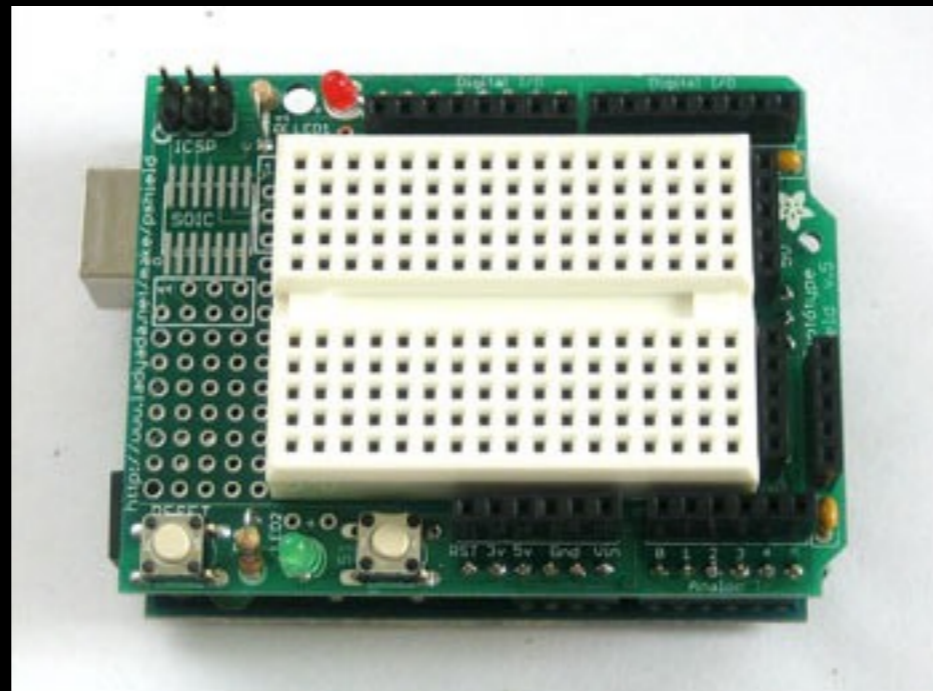


Shields

- A shield extends your Arduino functionality
- Shields come in much variety
- Shields are usual compatible with the “classic” arduino’s



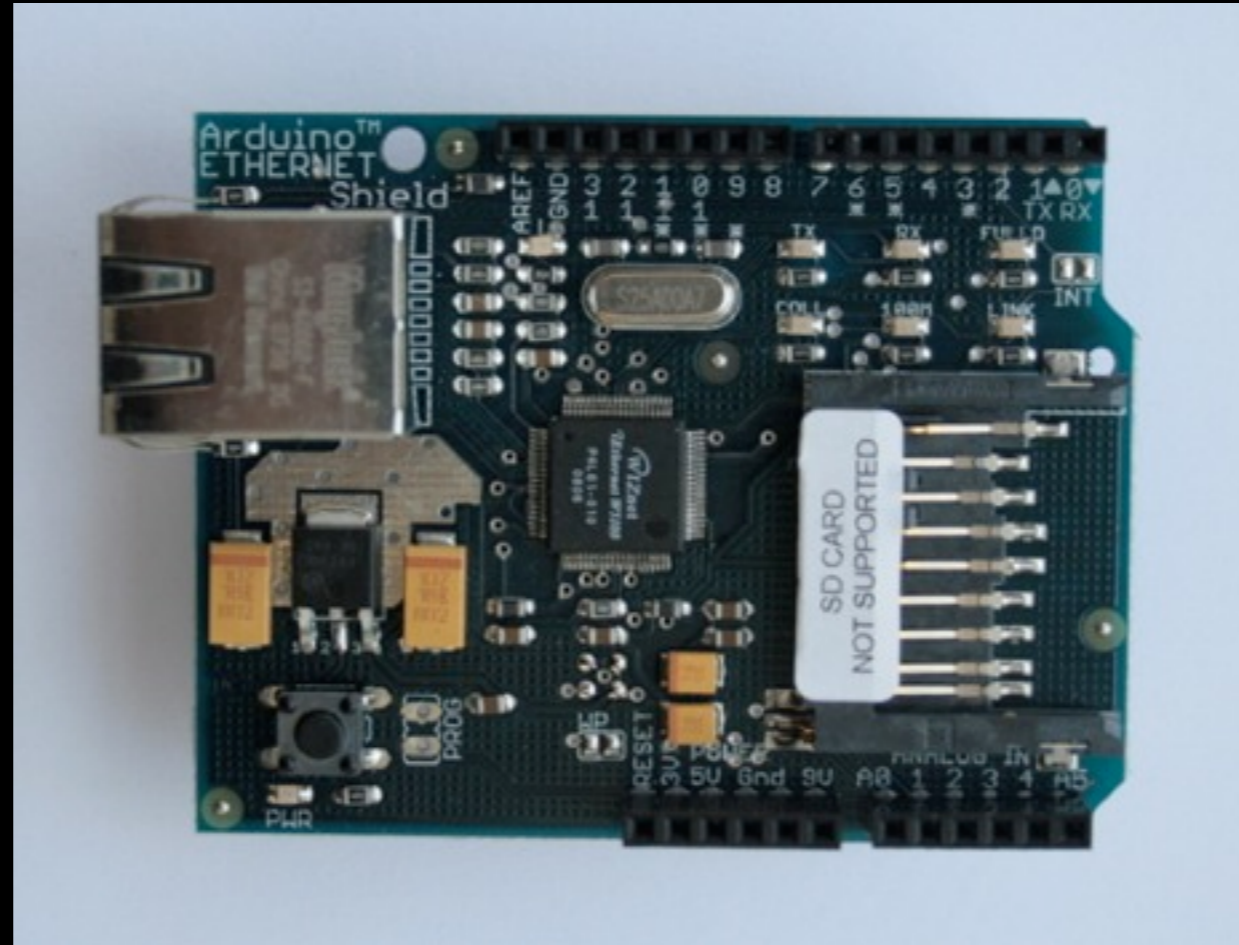
Shields



Protoshield



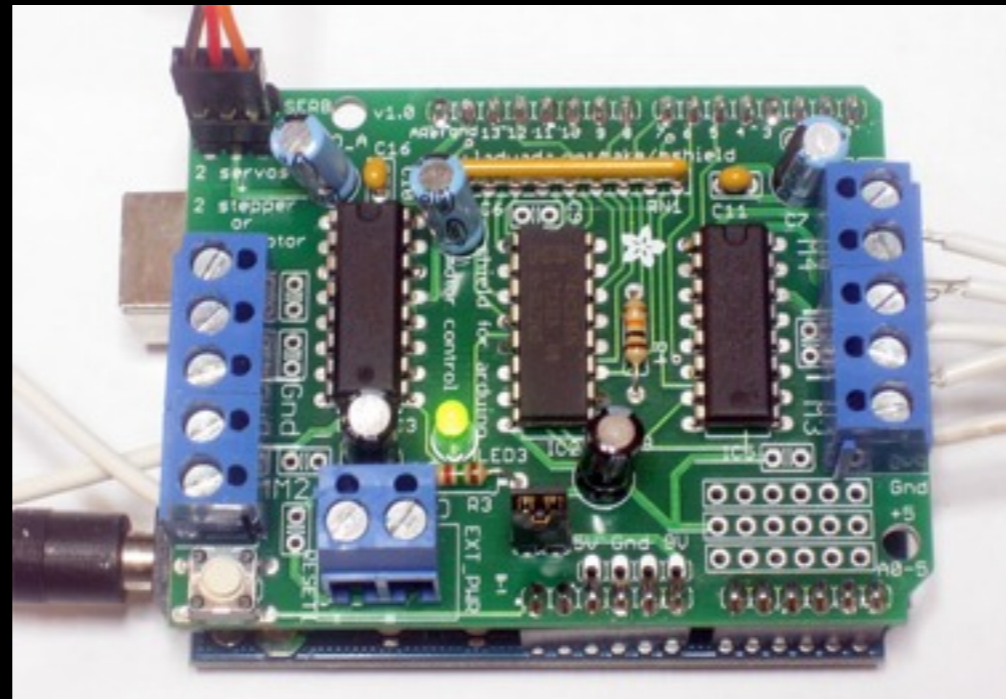
Shields



Ethernetshield



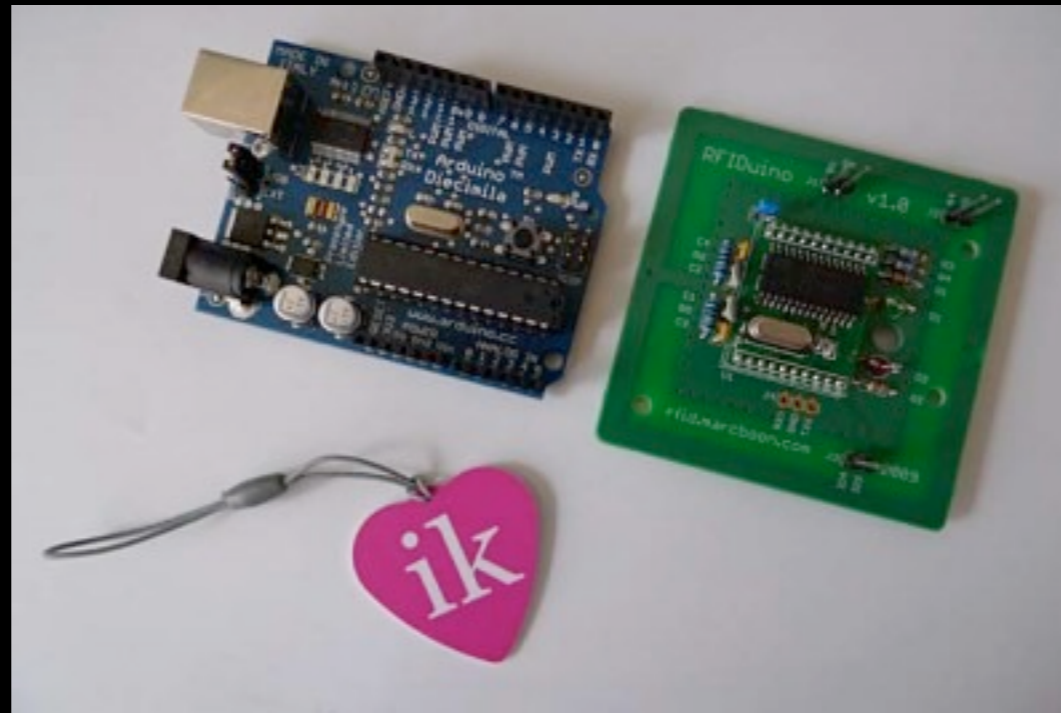
Shields



Motorshield



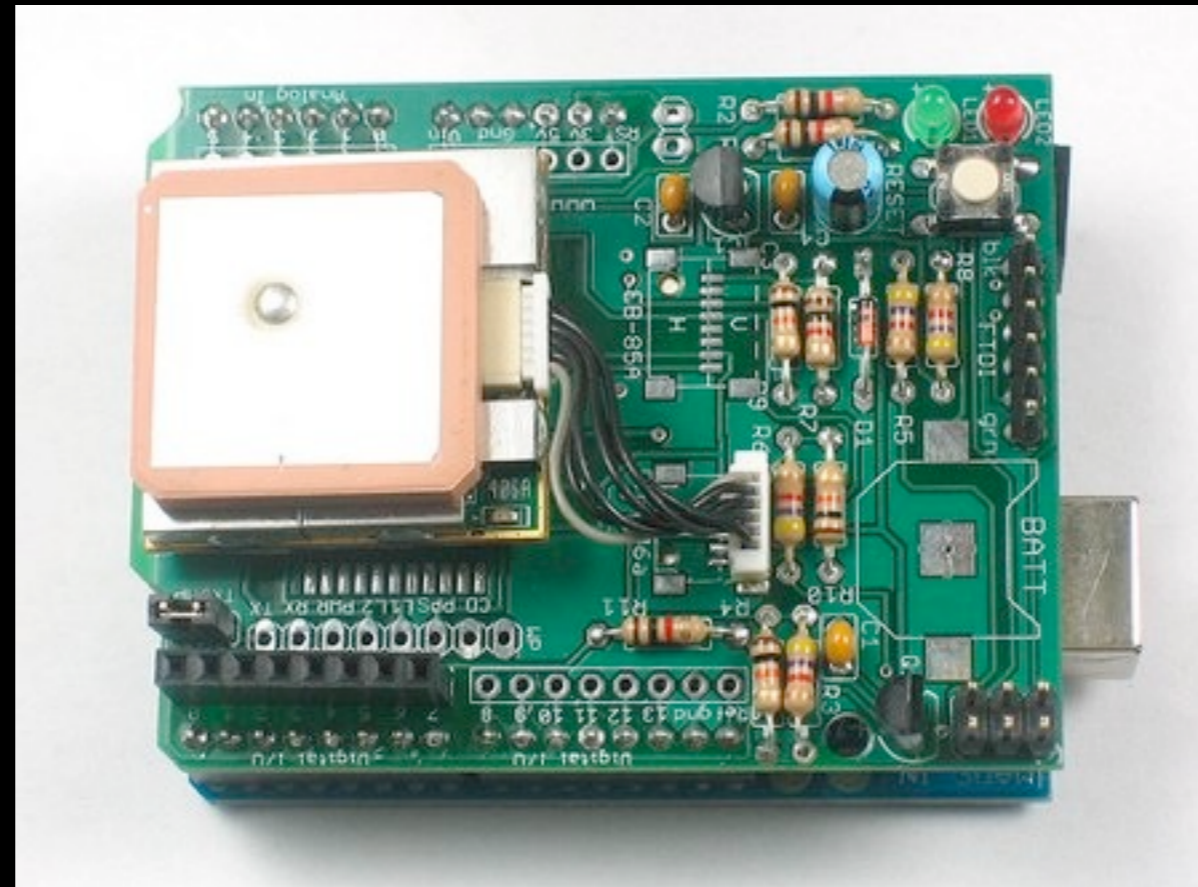
Shields



RFDuino



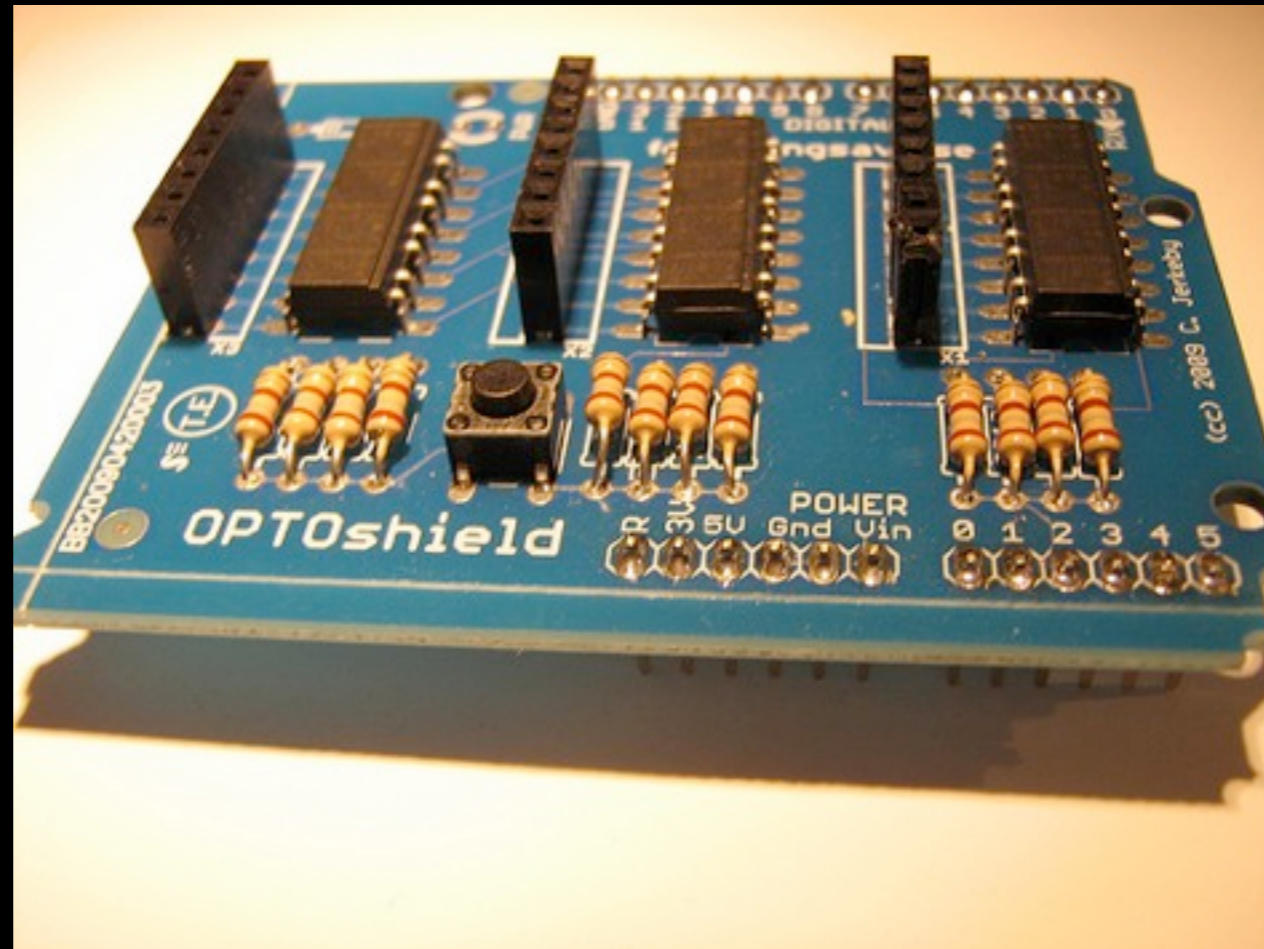
Shields



GPS shield



Shields



Optoshield



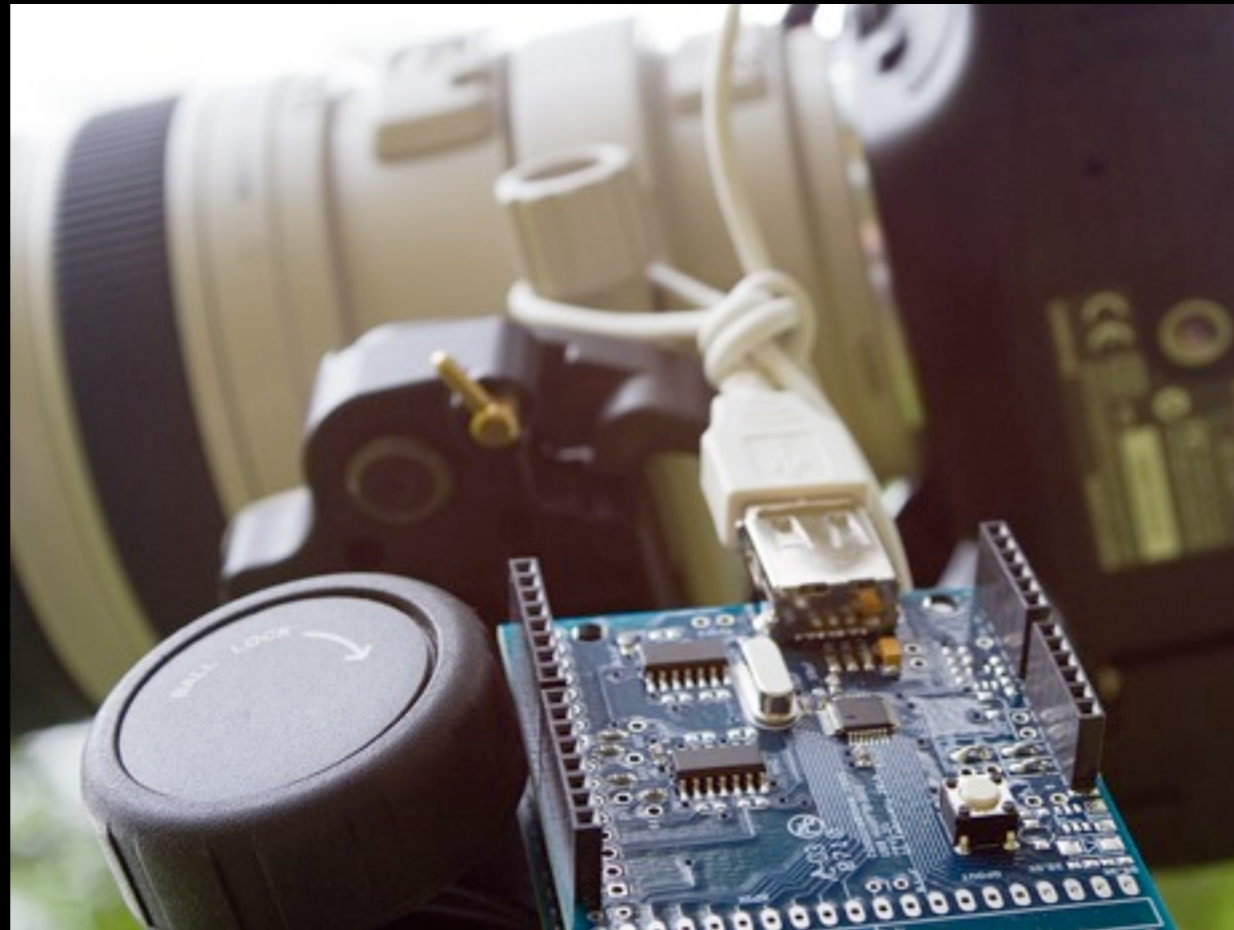
Shields



Waveshield



Shields



USB shield:

<http://www.circuitsathome.com/category/mcu/arduino/usb-shield>

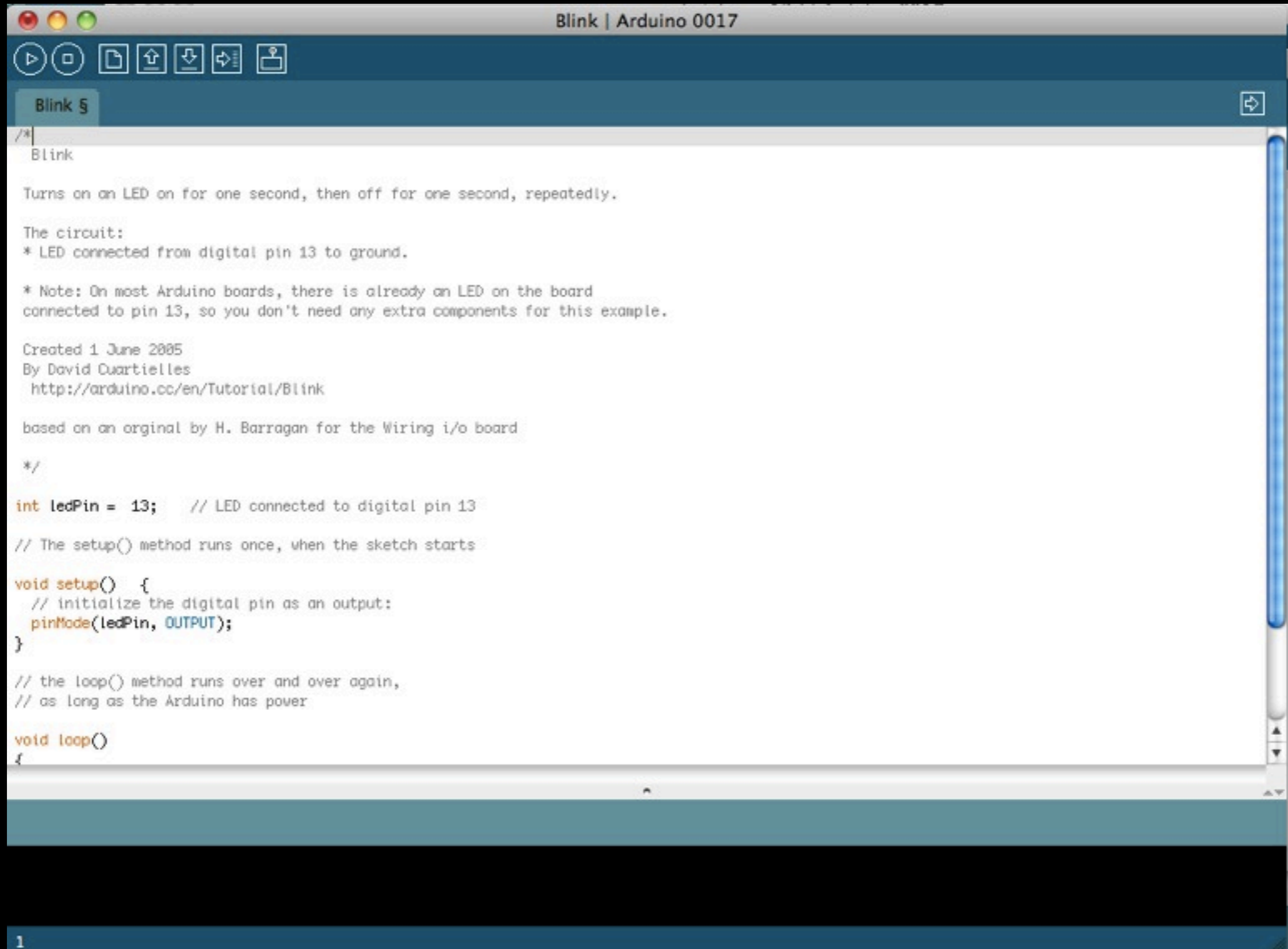


The GUI

- Multi platform
 - OSX
 - Windows
 - Linux
- Easy to use
- Examples to start



The GUI



The screenshot shows the Arduino IDE interface. The title bar reads "Blink | Arduino 0017". The toolbar includes icons for running, stopping, saving, opening, and uploading. The main text area contains the following code and comments:

```
/*  
Blink  
  
Turns on an LED on for one second, then off for one second, repeatedly.  
  
The circuit:  
* LED connected from digital pin 13 to ground.  
  
* Note: On most Arduino boards, there is already an LED on the board  
connected to pin 13, so you don't need any extra components for this example.  
  
Created 1 June 2005  
By David Cuartielles  
http://arduino.cc/en/Tutorial/Blink  
  
based on an original by H. Barragan for the Wiring i/o board  
  
*/  
  
int ledPin = 13; // LED connected to digital pin 13  
  
// The setup() method runs once, when the sketch starts  
  
void setup() {  
  // initialize the digital pin as an output:  
  pinMode(ledPin, OUTPUT);  
}  
  
// the loop() method runs over and over again,  
// as long as the Arduino has power  
  
void loop()  
{
```

The code is displayed in a monospaced font with syntax highlighting. The IDE window has a blue header bar and a scroll bar on the right side.



The Code

- C-like language
- Examples :-)
- setup “routine”
- loop “routine”



Practice

- Install the gui
- Hookup
- First code: hello world
- Play around with Arduino



Install the GUI

1. Download the arduino software:
<http://arduino.cc/en/Main/Software>
2. Install the USB drivers

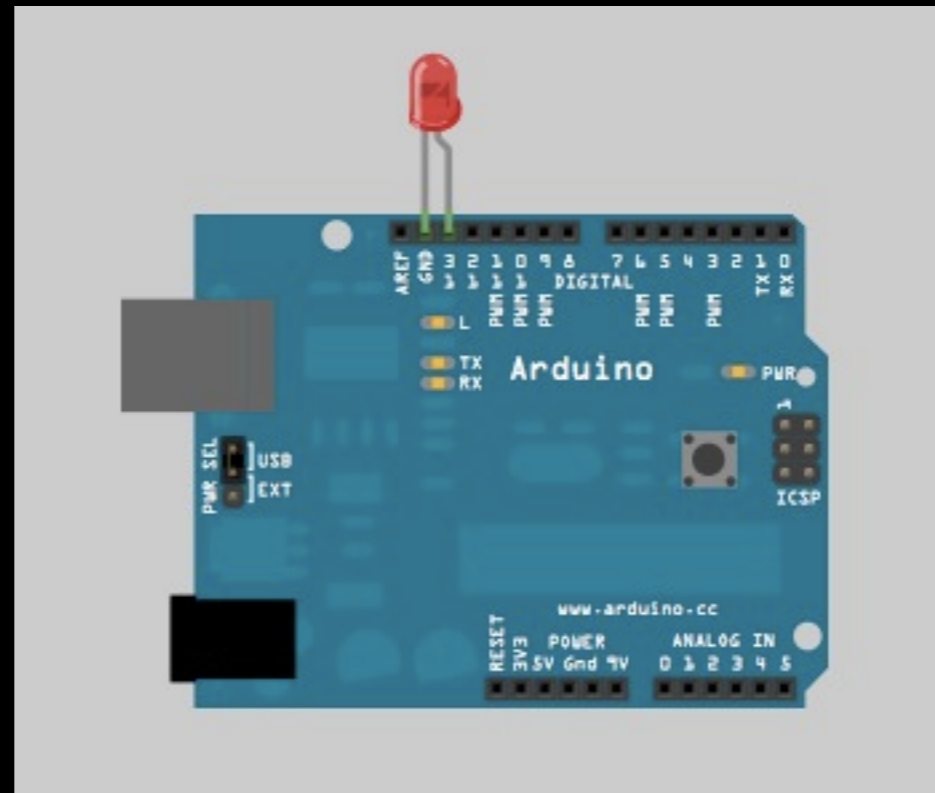


Hello ~~World~~ Arduino

1. Connect the Arduino
2. Start the Arduino software
3. You're ready to code



Practice 1



Practice 1

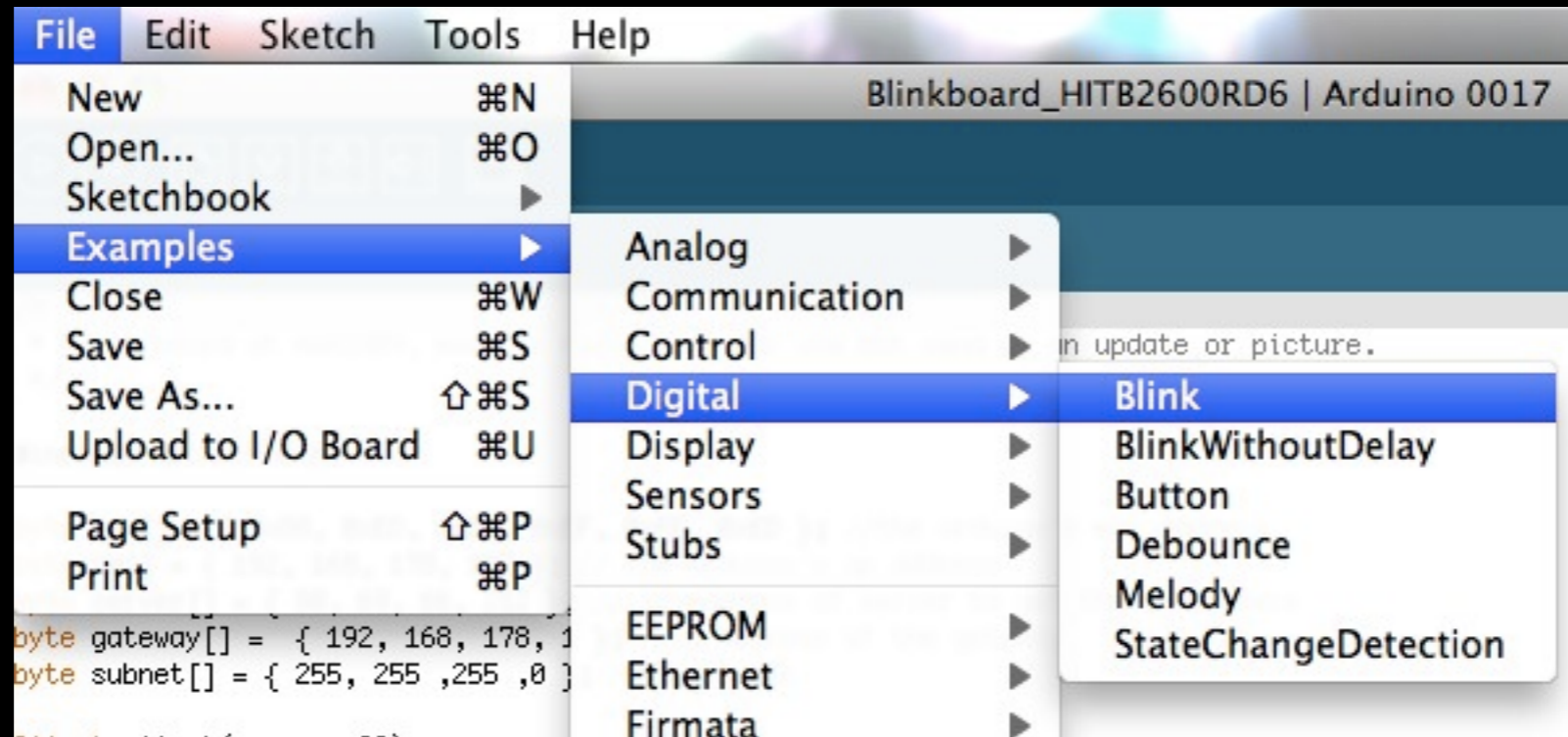
- Insert a LED in pin 13* and the ground next to it.
- Open the Arduino programm
- Connect the Arduino to your laptop with USB

* pin 13 has an on board resistor, the rest do



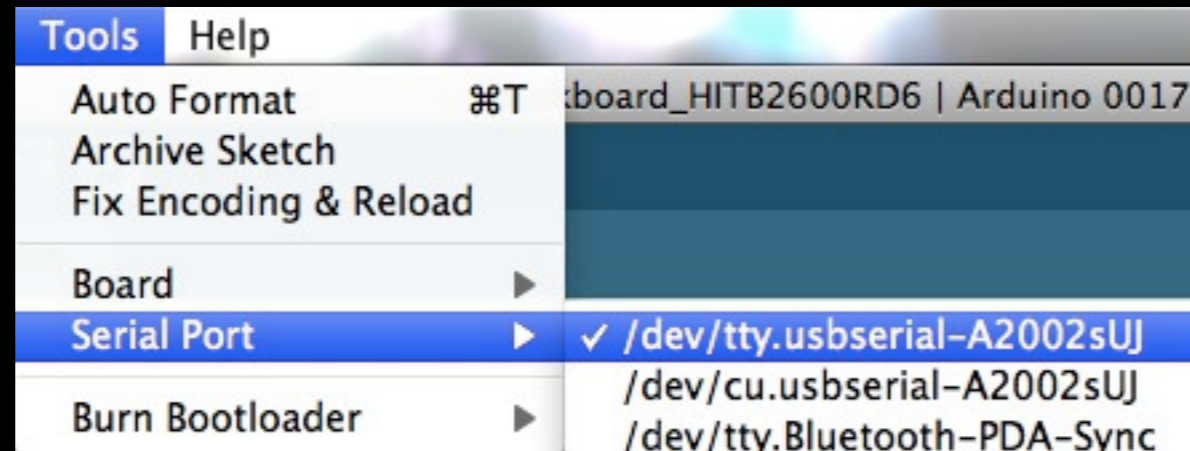
Practice 1

- Open an example:



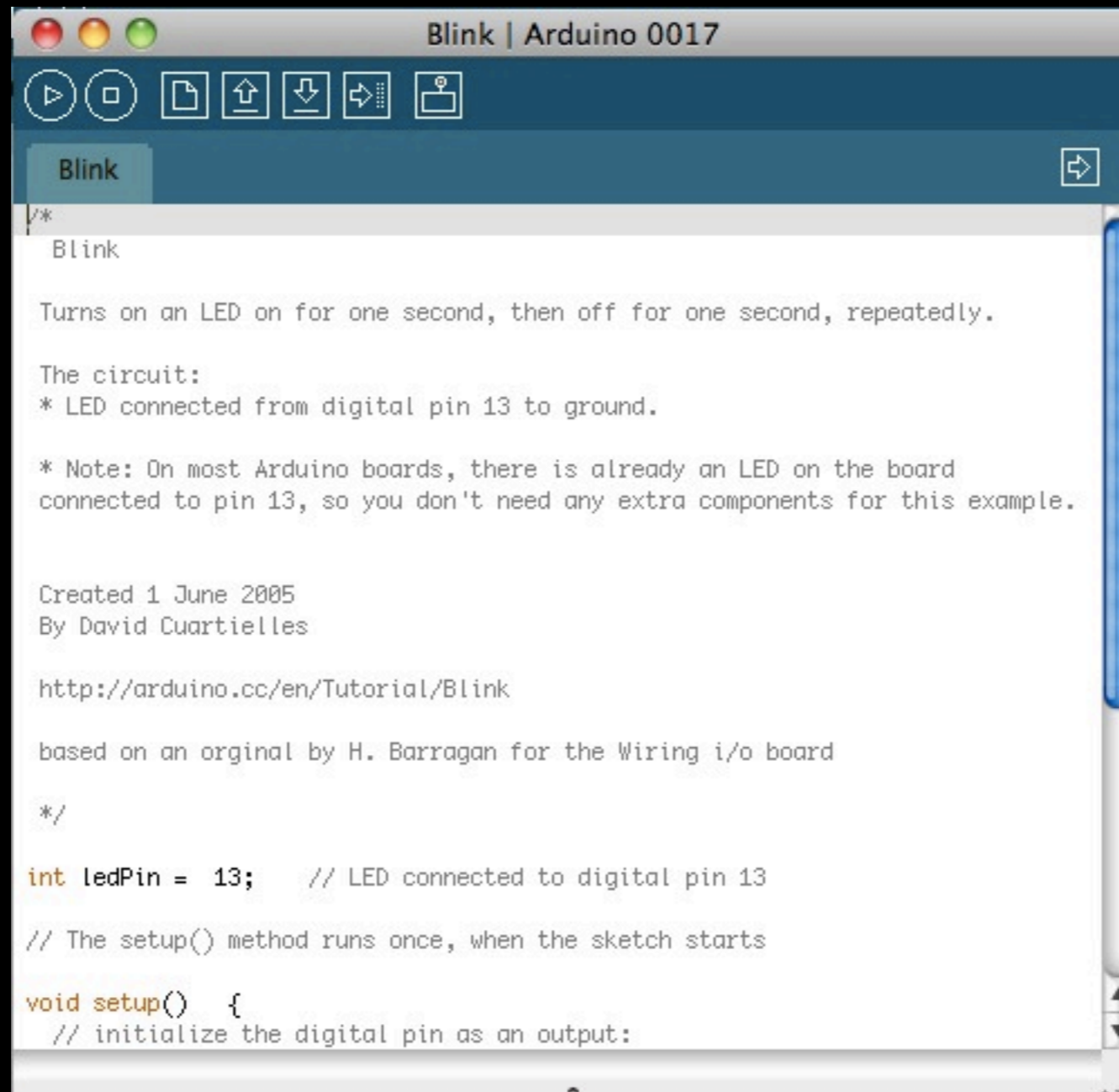
Practice 1

- Select your serial port



Practice I

- Upload the code

A screenshot of the Arduino IDE interface. The window title is "Blink | Arduino 0017". The toolbar shows icons for Run, Stop, New, Open, Save, Upload, and Download. The main editor area shows the code for the "Blink" sketch, which includes a multi-line comment describing the sketch's purpose and circuit, and the beginning of the C++ code. The code includes a pin definition and the start of the setup function.

```
/*  
Blink  
  
Turns on an LED on for one second, then off for one second, repeatedly.  
  
The circuit:  
* LED connected from digital pin 13 to ground.  
  
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*/  
  
int ledPin = 13; // LED connected to digital pin 13  
  
// The setup() method runs once, when the sketch starts  
  
void setup() {  
  // initialize the digital pin as an output:
```



Watch the LED



0xTHINK3R



0xTHINK3R

- shields: ethernetshield, datashield, rfidshield
- LEDwar? Knight-rider, randomblink,



?

