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**Have a go with  
Arduino.**

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# What is an Arduino?

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Arduino is an open source electronics prototyping tool that uses simple hardware and software. Its aimed at Artists, designers, hobbyists and anyone interested in making interactive objects and environments.

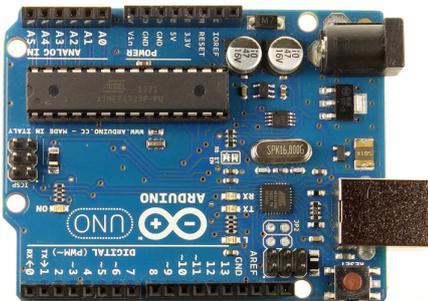
The word “arduino” refers to the actual circuit board, the software and the online community.

The arduino board is a microcontroller, capable of reading sensor data from components, processing it and causing other components to respond in various ways. Shields can also be bought for arduinos, there are other modules that clip on top of the microcontroller and allow it to do various things such as connect to the internet or control motors.

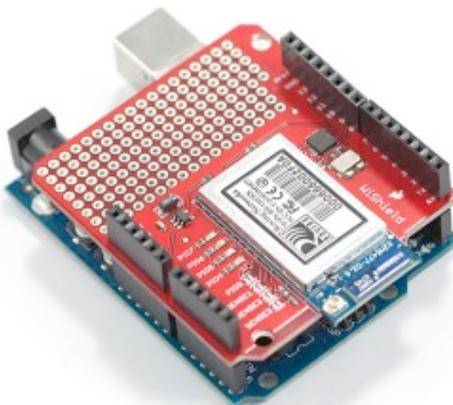
The software is freely downloadable from the internet, it is called the Arduino IDE ( Integrated Development Environment) and is roughly based on C programming.

The Arduino community consists of the arduino website, forum and other blogs where people share projects and help others out. These are always the best place to start with a new project; see if someone’s done something similar then adapt it to suit your needs, rather than starting from scratch.

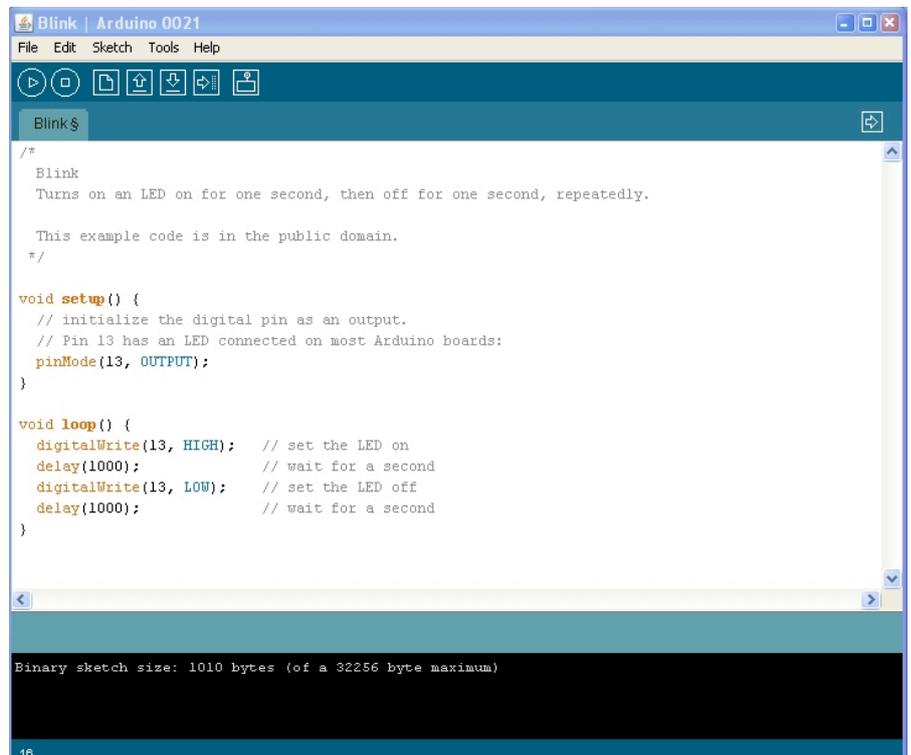
## Arduino Board



## Arduino wifi shield



## Arduino IDE



## Whats on the Board?

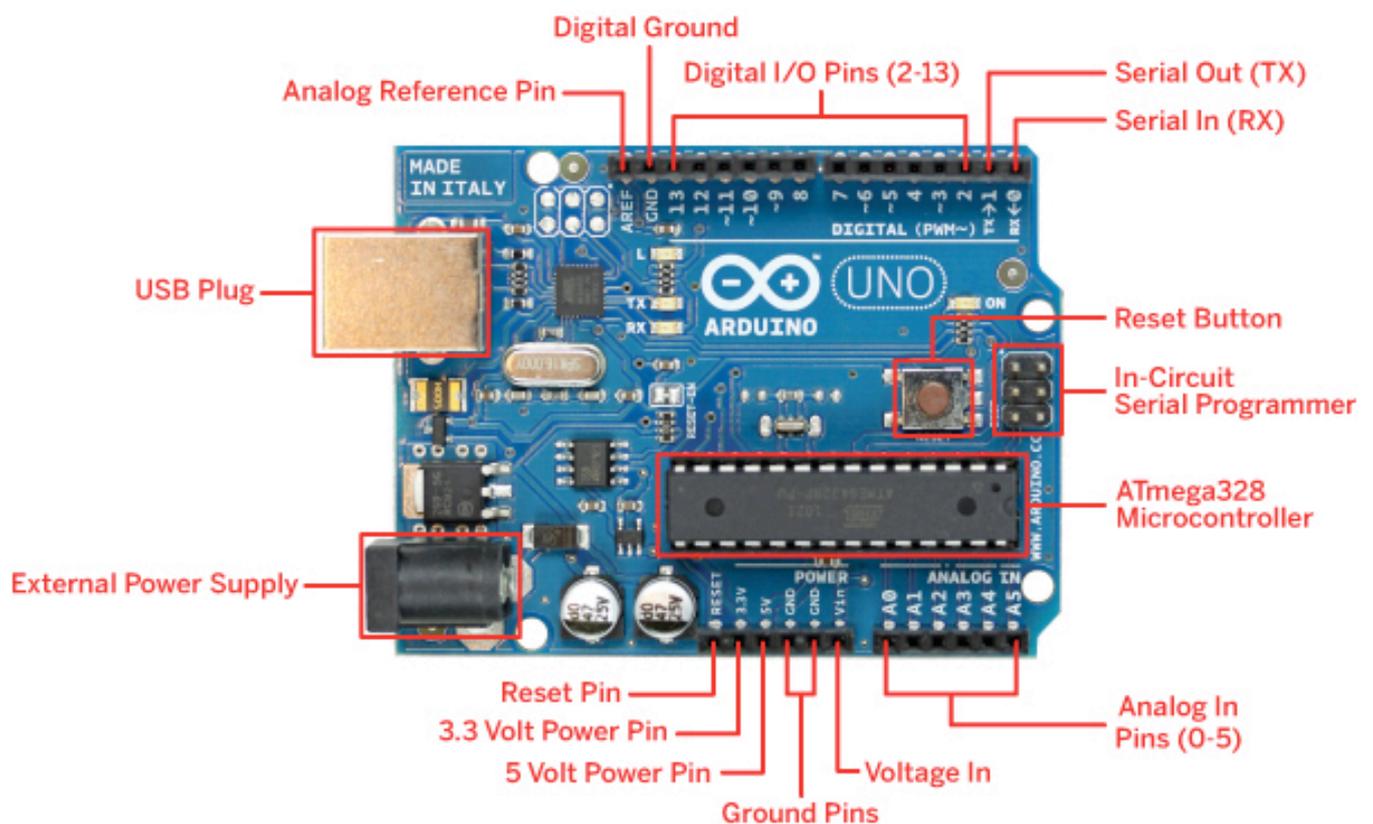
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The Arduino board can be plugged straight in to your computer with a USB cable for programming. It has a power socket that can be used for a 9v battery or an external power supply.

Each pin (numbered electrical connections in rows down the side of the arduino) has multiple uses such as: digital input, digital output, can read an analog signal, Can give an analogue output (pulse width modulation) or has a special purpose such as data communication.

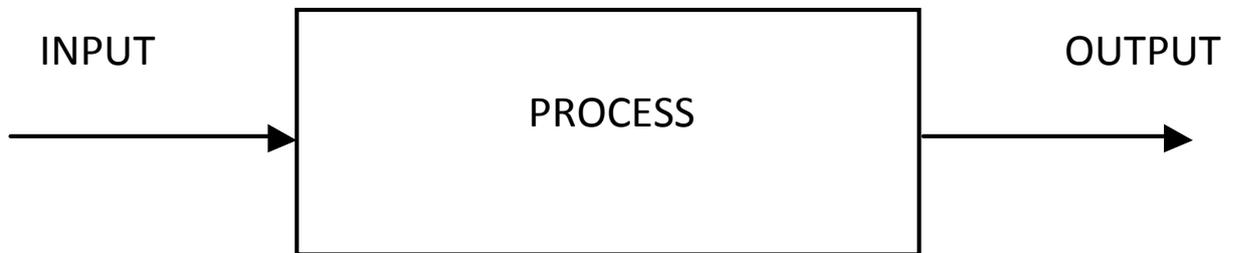
On the Arduino UNO board the only pins which can read an analog signal are the six on the lower left of the board. These are identified as A0 to A5. In addition to reading analog signals they also double as digital inputs or digital outputs.

14 pins on the right-hand-side of the board are digital input/output with additional features on a few pins identified on the labelling (RX and TX being serial data communication pins, ~ being PWM also known as analog output).



# Input and Output

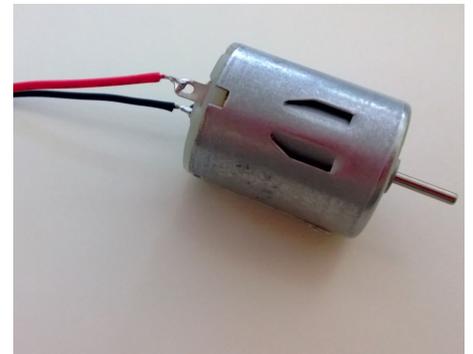
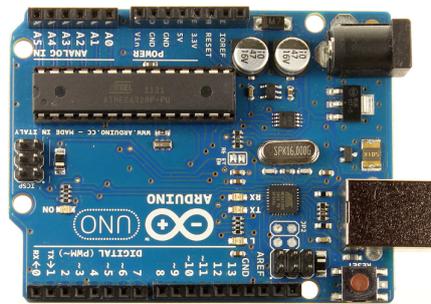
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Sensor data

Calculations

Results



## Digital and Analogue

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Digital signals are one of two states: on or off, HIGH or LOW, 1 or 0, 5 Volts or 0 Volts.



Analog signals can be any value. The signals we can handle on an Arduino must be within the limits of the 0 to 5 Volts that the Arduino operates at. Within the Arduino language we might see the analog signal stored in an integer (whole number) and limited to the range 0 – 1024, where 0 = 0 Volts, 1024 = 5 Volts and numbers in between follow a linear relationship.

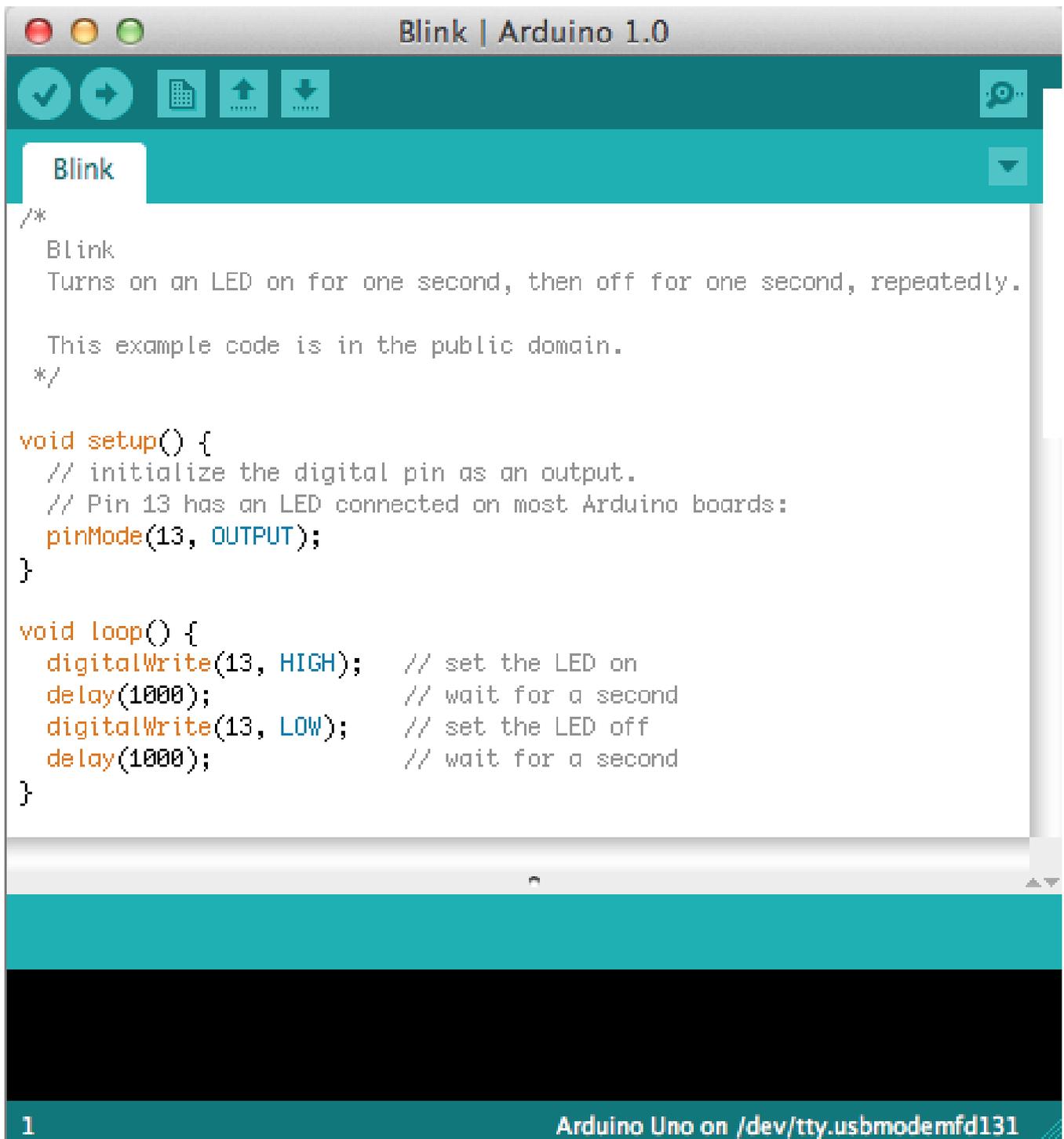


When outputting Analog from an Arduino we are in fact taking a number between 0 and 255 and pulsing the pin to provide the corresponding on time.



## Programming

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The image shows a screenshot of the Arduino IDE interface. The window title is "Blink | Arduino 1.0". The top toolbar contains icons for a checkmark, a right arrow, a document, an upload arrow, a download arrow, and a search icon. Below the toolbar, a tab labeled "Blink" is active. The main text area contains the following code:

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

  This example code is in the public domain.
  */

void setup() {
  // initialize the digital pin as an output.
  // Pin 13 has an LED connected on most Arduino boards:
  pinMode(13, OUTPUT);
}

void loop() {
  digitalWrite(13, HIGH); // set the LED on
  delay(1000);           // wait for a second
  digitalWrite(13, LOW); // set the LED off
  delay(1000);           // wait for a second
}
```

At the bottom of the IDE, there is a status bar with the text "1" on the left and "Arduino Uno on /dev/tty.usbmodemfd131" on the right.

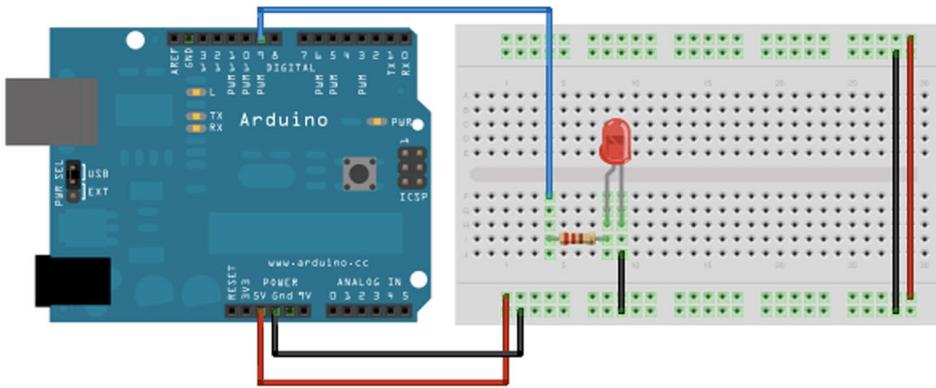
The arduino examples that come with the IDE and the libraries on the Arduino website are invaluable tools when it comes to programming. There is rarely a need to start a code from scratch, always base it on an existing one.

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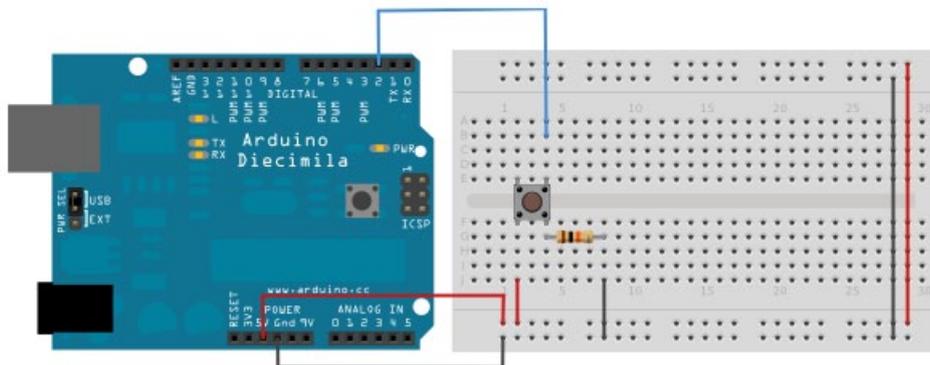
# Some Basic Circuits?

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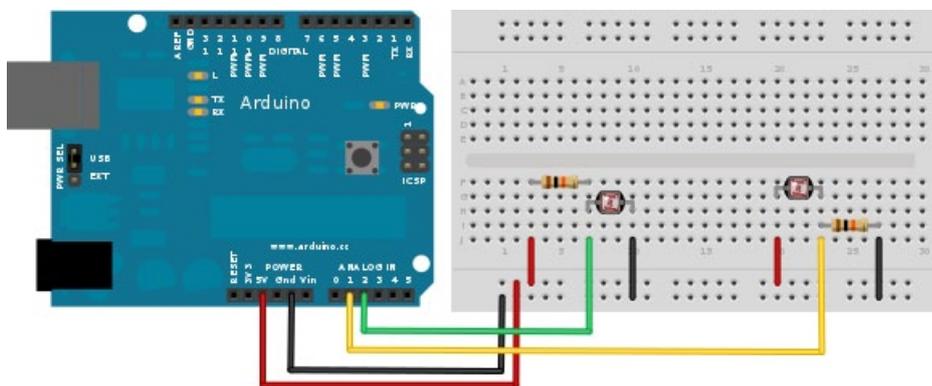
## How to wire and LED



## How to wire a Button

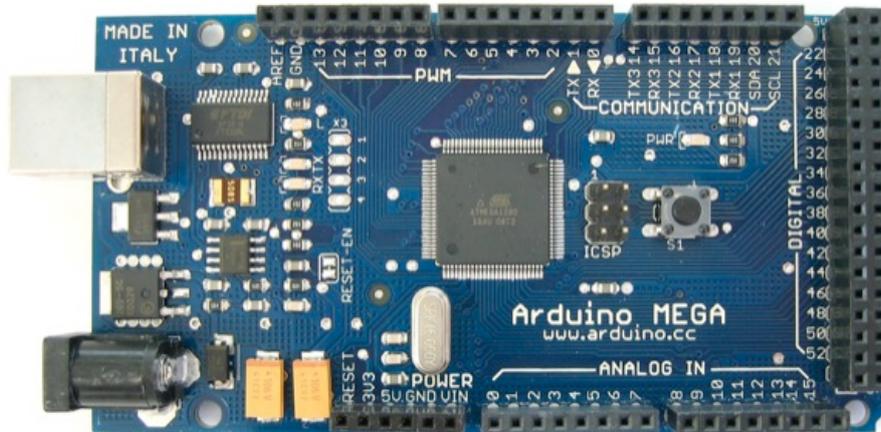


## How to wire an LDR

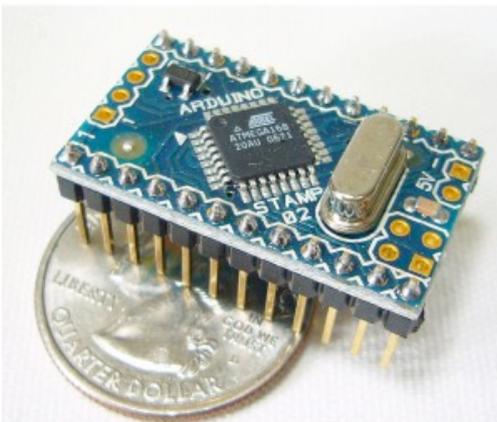


## What Next?

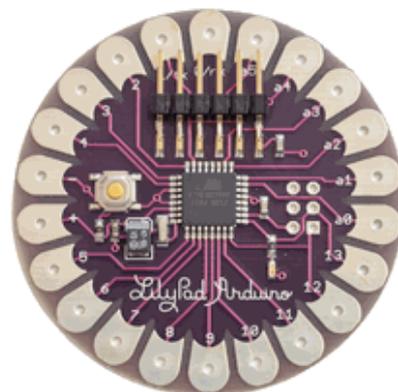
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**Arduino Mega** - for larger projects requiring more pins and processing power



**Arduino Nano** - when you need the electronics to be as small as possible.



**Arduino LilyPad** - allows you to embed electronics in to fabrics using conductive thread instead of wire.

Have a look on the Arduino playground; [playground.arduino.cc](http://playground.arduino.cc) , the forum; [forum.arduino.cc](http://forum.arduino.cc) and other websites such as [www.instructables.com](http://www.instructables.com) for help and project ideas.

Contact [Nicky@MAKLab.co.uk](mailto:Nicky@MAKLab.co.uk) with any follow up questions from this workshop.

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