

Powerful Electronics With



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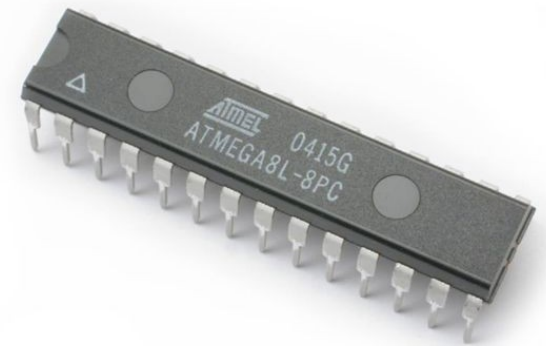
Microcontrollers

Small Computers on a single integrated circuit containing

- A processor core
- Memory
- I/O devices

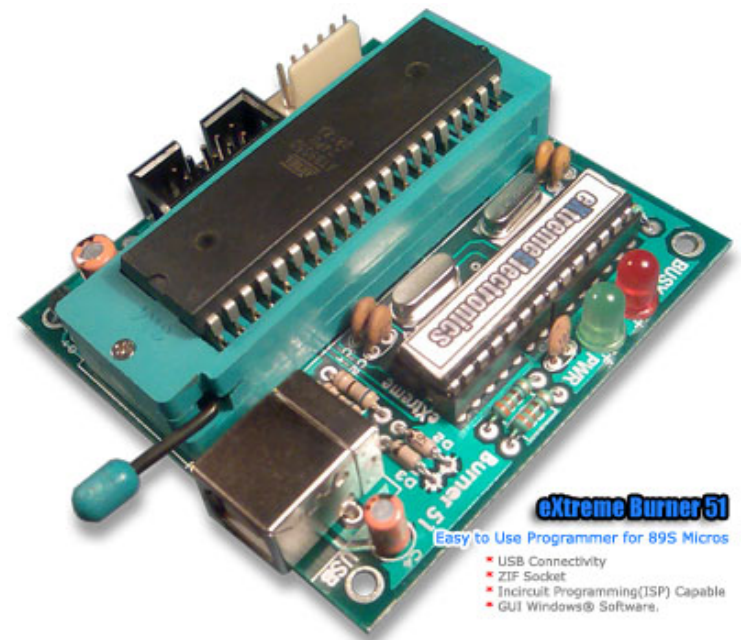
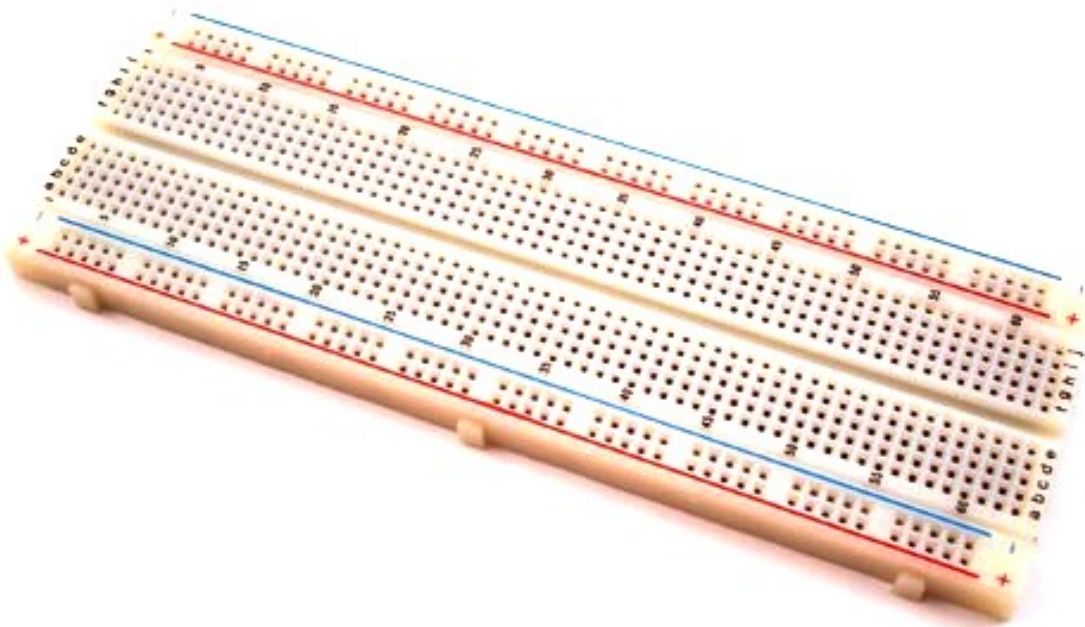
Some of the most used types:

- Atmel AVR
- Microchip PIC



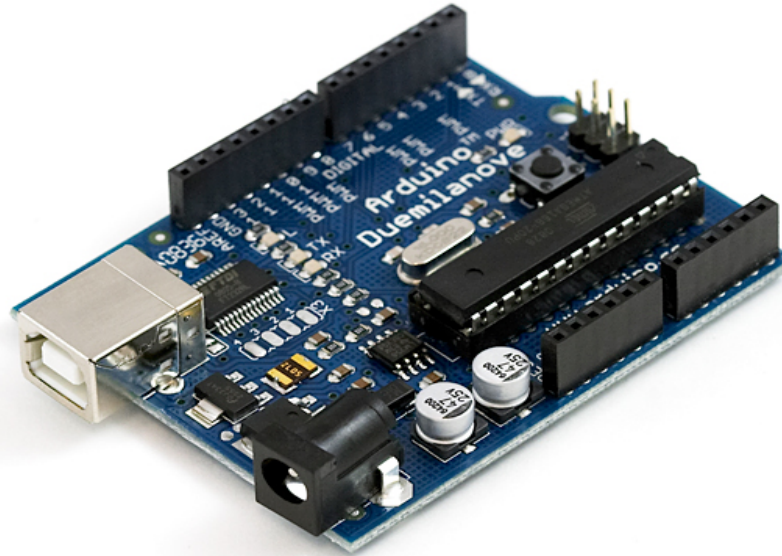
What do you need to program a Microcontroller

- Microcontroller Chip
- Prototyping Board
- Corresponding Burner / Development Kit
- Compiler
- Optionally IDE



What is Arduino

Arduino is an **Open Source** electronics prototyping platform based on easy to use hardware and software.



Why is Arduino so popular

- Open Source
- IDE works on Linux , Macs, and Windows
- Tons of Libraries
- Tons of shields , accessories , sensors and modules
- Low cost
- Simple and Attractive

Tech Specs

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

Lets Start Hacking !

First Download IDE / Compiler from :

- Ubuntu Software Center
- Online : <http://arduino.cc/en/Main/Software>

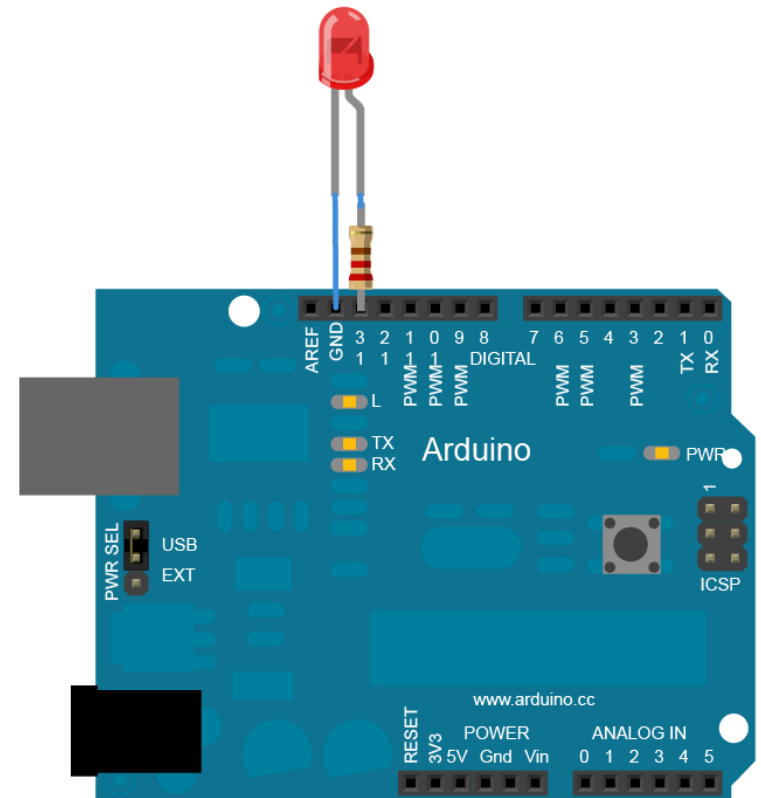
Optionally Download Fritzing (Electronics Designer)

- <http://fritzing.org/>

Hello World Application

```
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  
}
```



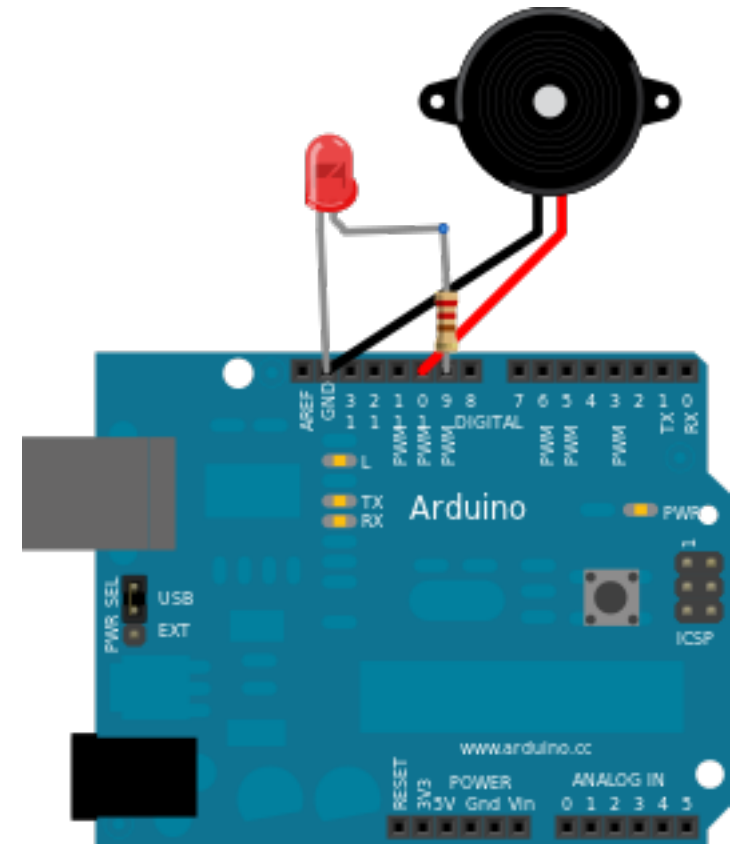
Hello World cont.

- setup()
- loop()
- pinMode()
- digitalWrite()
- delay()

Sound The Alarm (Digital)

```
int ledPin = 9;  
int alarmPin = 10;
```

```
void setup() {  
  pinMode(ledPin, OUTPUT);  
  pinMode(alarmPin, OUTPUT);  
}  
void loop() {  
  digitalWrite(ledPin, HIGH);  
  digitalWrite(alarmPin, HIGH);  
  delay(1000);  
  digitalWrite(ledPin, LOW);  
  digitalWrite(alarmPin, LOW);  
  delay(1000);  
}
```



Made with  Fritzing.org

Sound The Alarm (PWM)

//PWM: 3, 5, 6, 9, 10, and 11.

int ledPin = 9;

int alarmPin = 10;

void setup() { }

void loop() {

for(int fadeValue = 0 ; fadeValue <= 255; fadeValue +=20) {

analogWrite(ledPin, fadeValue);

analogWrite(alarmPin,fadeValue);

delay(30);

}

for(int fadeValue = 255 ; fadeValue >= 0; fadeValue -=20) {

analogWrite(ledPin, fadeValue);

analogWrite(alarmPin,fadeValue);

delay(30);

}

}

Make It Interactive

```
int alarm = LOW;
int val;
void setup() {
  Serial.begin(9600);
  Serial.flush();
}
void loop() {

  if(Serial.available())
  {
    val = Serial.read();
    Serial.println(val);
    if (val == 'A') alarm = HIGH;
    else alarm = LOW;
  }
  if (alarm)
  {
    Alarm();
  }
  else
  {
    analogWrite(ledPin,0);
    analogWrite(alarmPin,0);
  }
}
```

```
import serial
import time
```

```
sp = '/dev/ttyACM0'
ser = serial.Serial(sp,9600)
```

```
seconds = 0.0
```

```
while seconds < 10:
  ser.write('A')
  time.sleep(.8)
  seconds += .8
```

Extra Step

- Install gnome-alarm
- set an alarm to 'Sound the Alarm !'

Questions

Where to Buy :

Online Local Electronics Stores

<http://ram-e-shop.com/>

<http://egyrobots.com/>

<http://www.fut-electronics.com/>