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Club Robotique ISIMM

The future is bright, The future is robots

Arduino

Samedi 29/10/2016

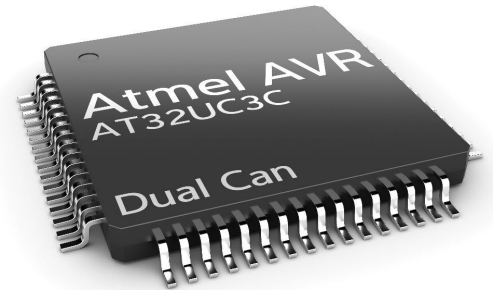
PLAN:

1. Notion de microcontrôleur.
2. Arduino?
3. Les Arduino’s.
4. Arduino UNO .
5. Capteurs analogique,Numérique
6. Capteurs de Couleurs.
7. Moteurs
8. Programmation:
    - Data types and operators.
    - What is “Function”?
    - Control statements [if, if… else, switch case.].
    - Loop statements[while, for, do… while.].
    - Common functions

Introduction

Design, organize, and collaborate

Micro-Controller:



MCU : cerveau du système automatisée

1. **Un µ.processeur**
2. **Une mémoire de données (RAM ou EEPROM) = Données**
3. **Une mémoire programmable (ROM) = Programme**
4. **Ressources auxiliaires : Timers, CAN, GPIO**

Arduino.

C’est quoi Arduino?

- ✓ **Bar d’une petite ville du nord de l’Italie**
- ✓ **Massimo Banzi**
- ✓ **Sortie en 2005**
- ✓ **Arduino a initié une révolution DIY**

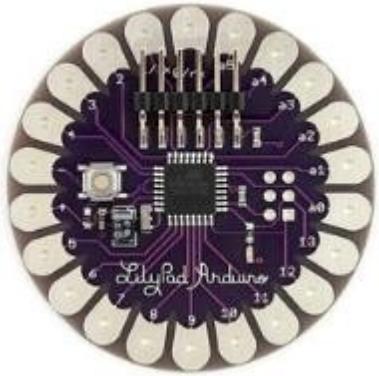
Comment utiliser ?

- Il faut télécharger le logiciel de programmation sur le site Arduino.
- L'installer sur son ordinateur (le logiciel est compatible Linux, Mac OSX et Windows).

Arduino’s:

UNO

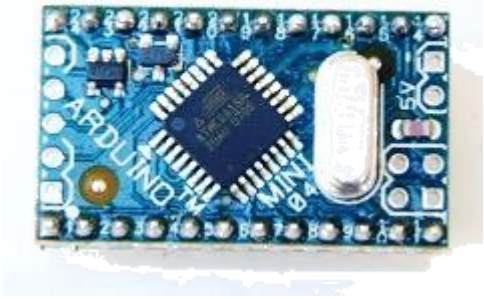
Mega



LilyPad

Arduino BT

Arduino Nano



Arduino Mini

Arduino UNO:

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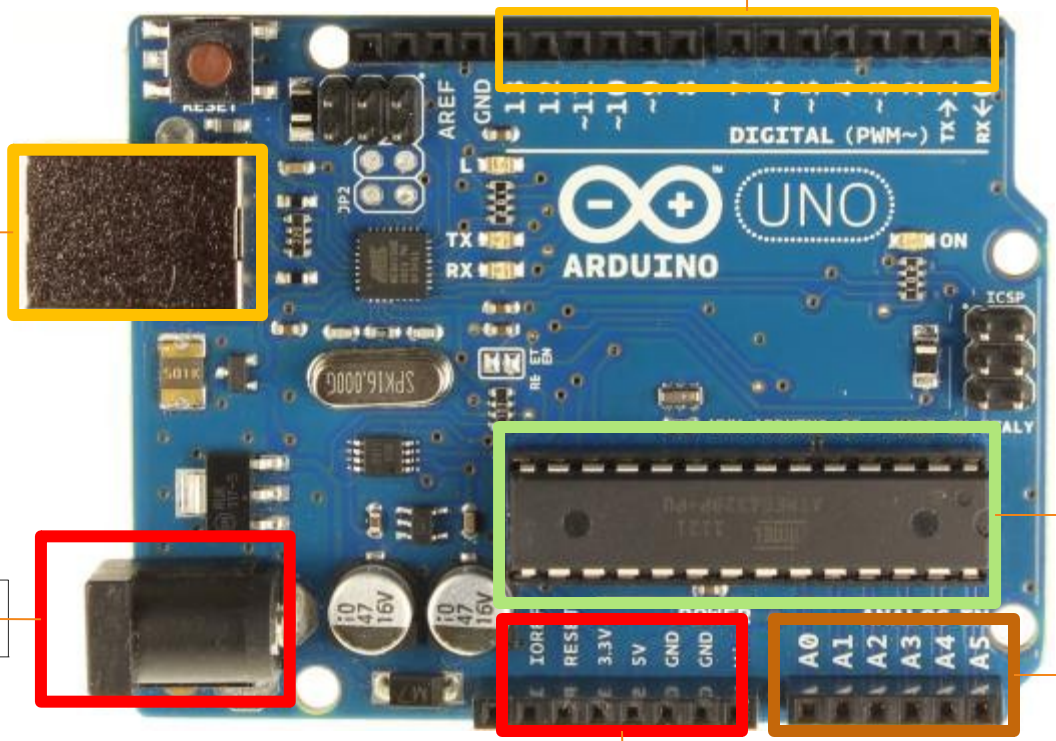
Digital output, PWM.
0,1: Serial port.



USB port

Atmel MicroController

Power input

Power Supply

Analog input.

Digital and analog.

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Digital or Analog?

Tout Les Quantités Physiques sont d'origine ANALOGIQUES.

- **Analog (analogique)**

C'est la quantité d'information comprise entre la valeur minimale et la valeur maximale.

- **Digital (numérique)**

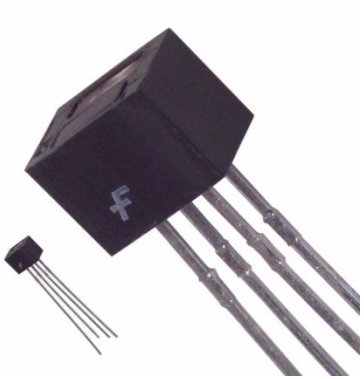
C'est la valeur d'un TOR(tout ou rien), au domaine d'electronique c'est la convertion automatique d'une valeur analogique.

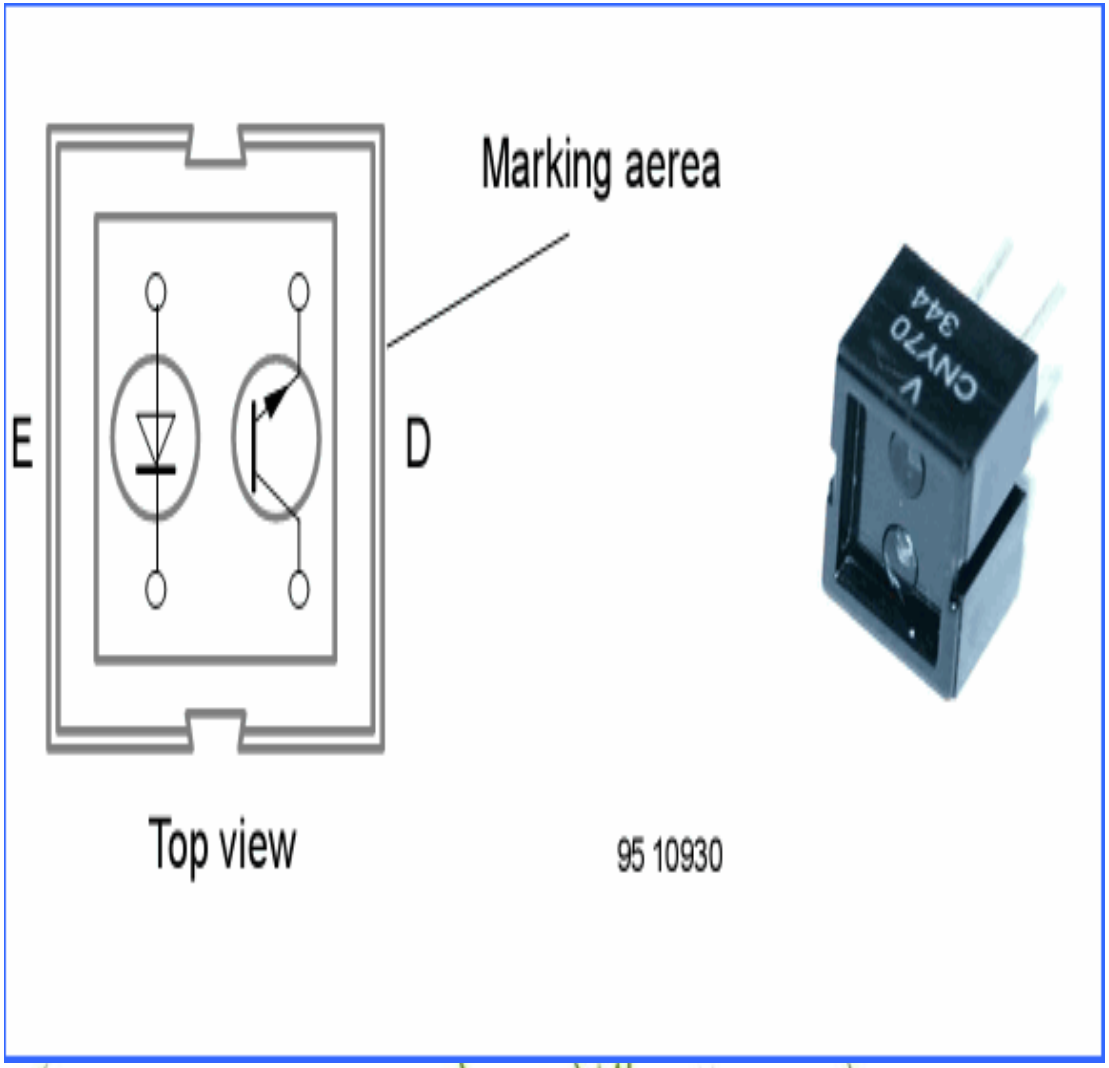
Ex: 1- Digital:
English alpha consists of 26 letter, there is no letter between *A* and *B*.

Ex.: 2- Analog:
Temperature, can take any value[-1,12.8,25.002,… etc.].
- Sine waves are analog.

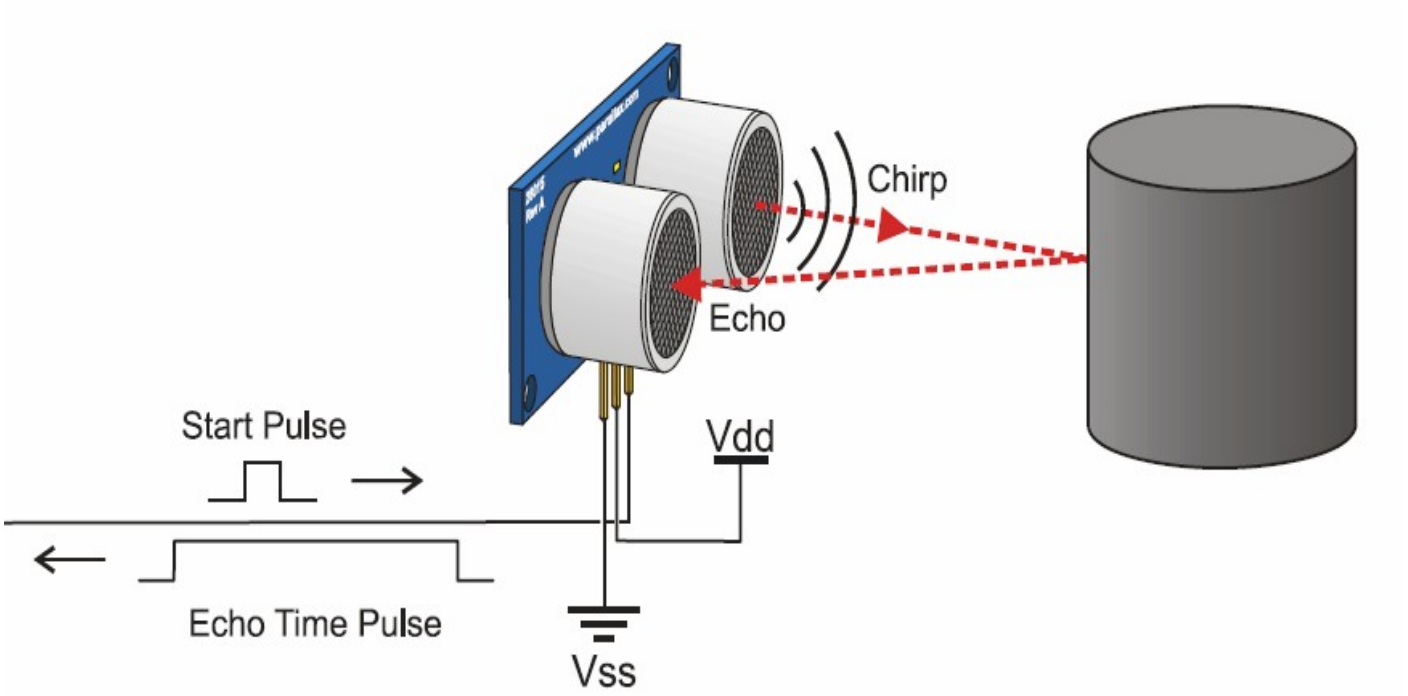
Digital, Analog Sensor

Capteur de couleur:

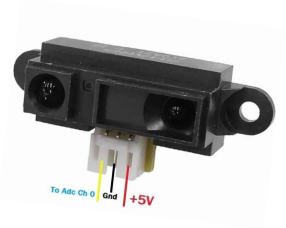


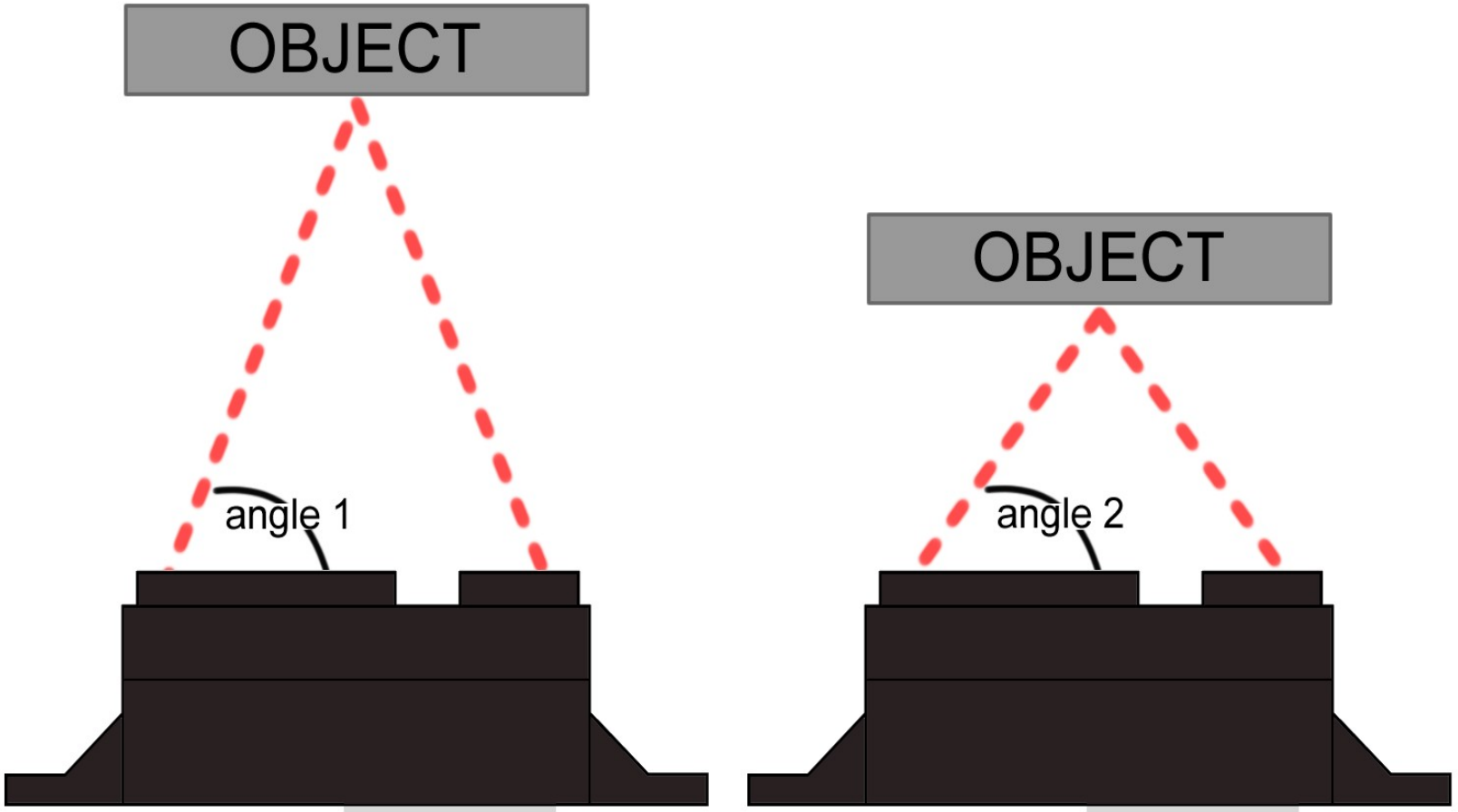


Capteur Ultrason



Capteur Sharp





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Capteur CNY7(

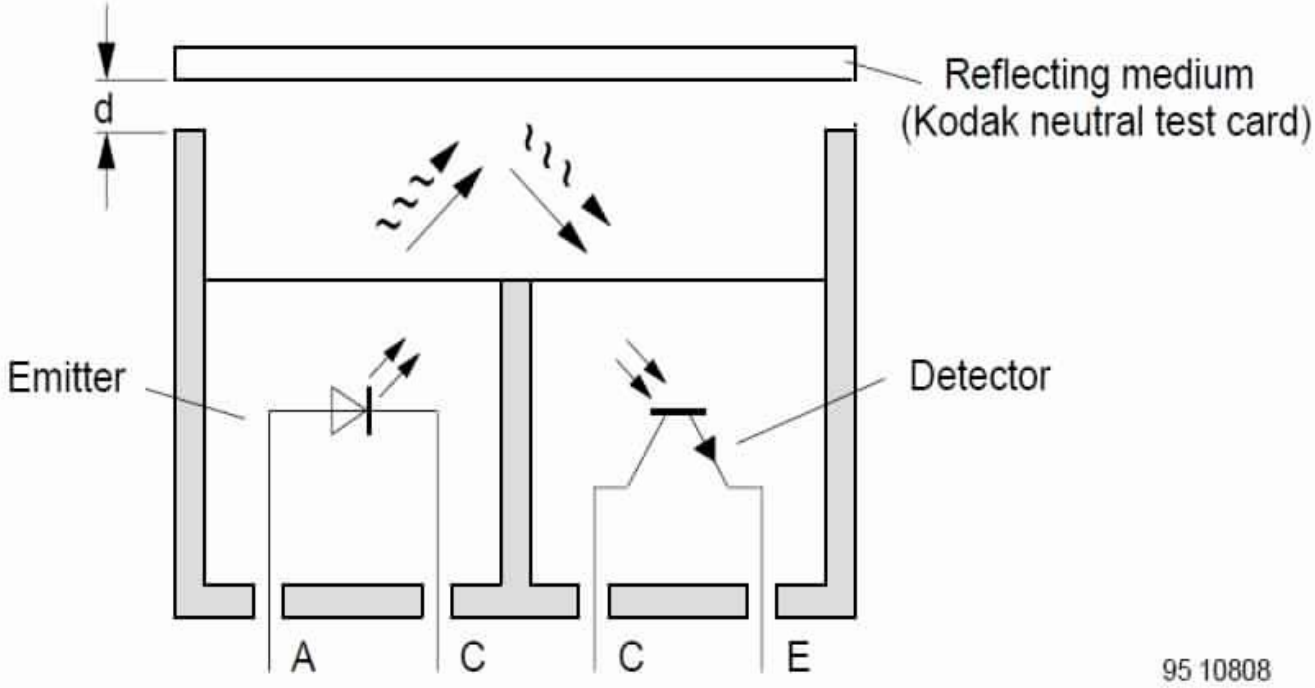
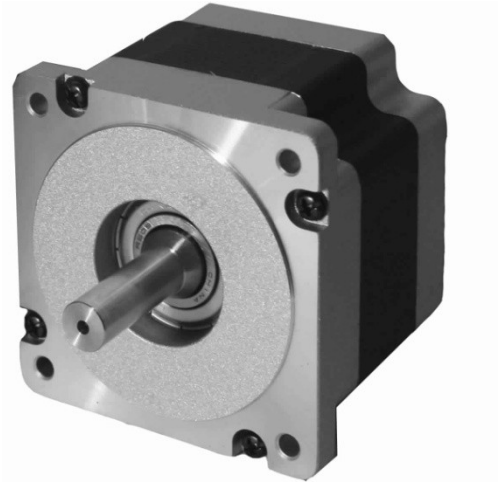
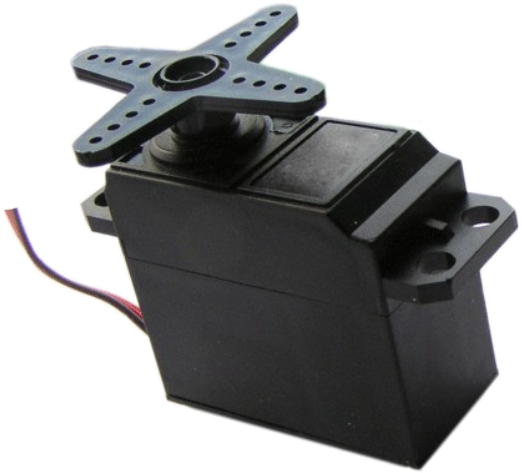


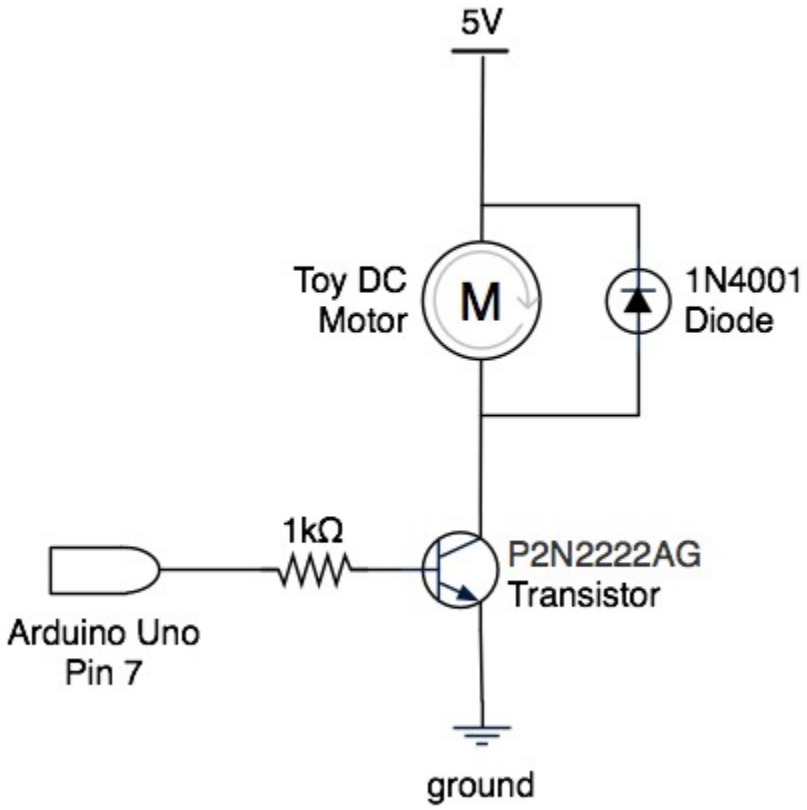
Figure 1. Test circuit

Motors

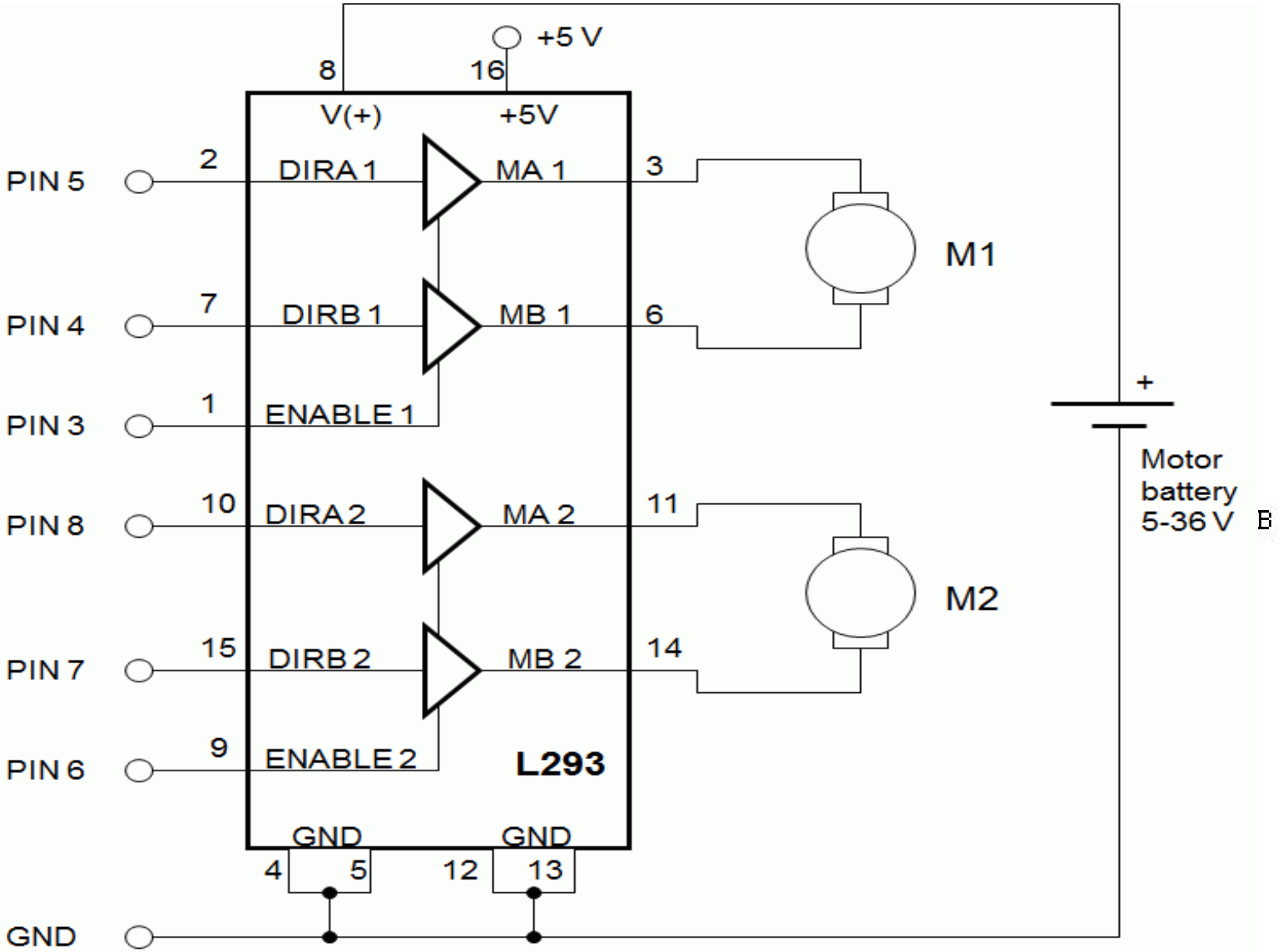




Interfacing DC Motors



Interfacing Motors



Arduino Coding.

Stylize, edit, and animate your media

Data Types and operators

Integer: used with integer variables with value between 2147483647 and -2147483647.

Ex: int x=1200;

Character: used with single character, represent value from -127 to 128.

Ex. char c=‘r’;

Statement and operators:

Statement represents a command, it ends with **;**

Ex:

```
int x;
x=13;
```

Operators are symbols that used to indicate a specific function:

- Math operators: [**+,-,*,/,%,^**]
- Logic operators: [**!=, &&, ||**]
- Comparison operators: [**==, >, <, !=, <=, >=**]

Syntax:

; Semicolon, **{}** curly braces, **//**single line comment, ***/*Multi-line comments*/***

Control statements:

If Conditioning:

if(*condition*)
{
statements-1;
...
Statement-N;
}
else if(*condition2*)
{
Statements;
}
Else*{statements;}*

Control statements:

Switch case:

```
switch (var) {
  case 1:
    //do something when var equals 1
    break;
  case 2:
    //do something when var equals 2
    break;
  default:
    // if nothing else matches, do the default
    // default is optional
}
```

Loop statements:

Do… while:

```
do
{
Statements;
}
while(condition);  // the statements are run at least once.
```

While:

```
While(condition)
{statements;}
```

for

```
for (int i=0; i <= val; i++){
      statements;
   }
```

Use *break* statement to stop the loop whenever needed.

Code structure:

Void setup(){}
Used to indicate the initial values of system on starting.
Void loop(){}
Contains the statements that will run whenever the system is powered after setup.

Input and output:

Used functions:
pinMode();
digitalRead();
digitalWrite();
 delay*(time_ms);*
other functions:
analogRead();
analogWrite();//*PWM.*

Let’s try:

Led control using Arduino:

Make led high

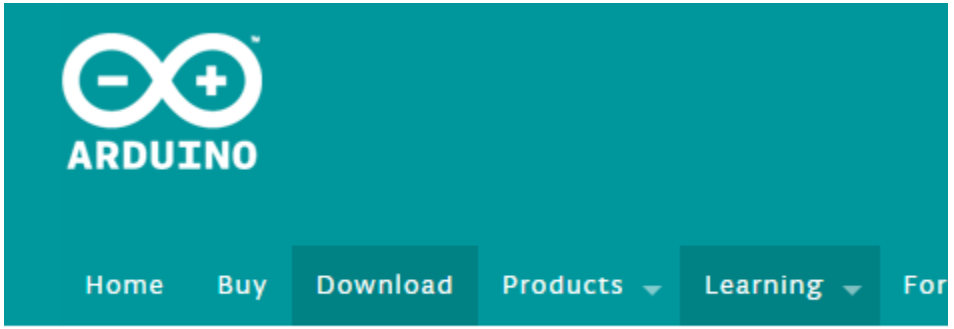
```
IED = 3;
void setup()
{
PinMode(LED,OUTPUT);
}
void loop()
{
DigitalWrite(LED,HIGH);
}
```

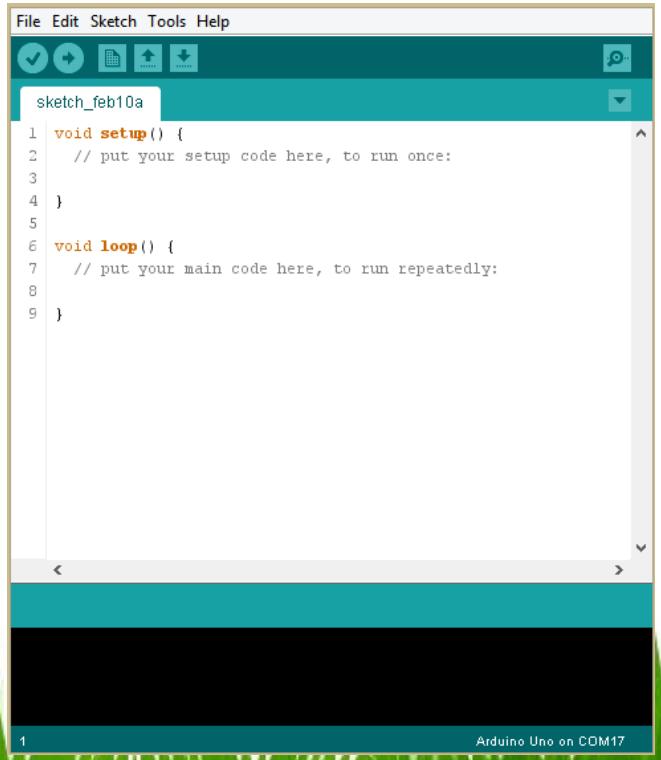
References…

Start learning Arduino from here…

Arduino IDE:

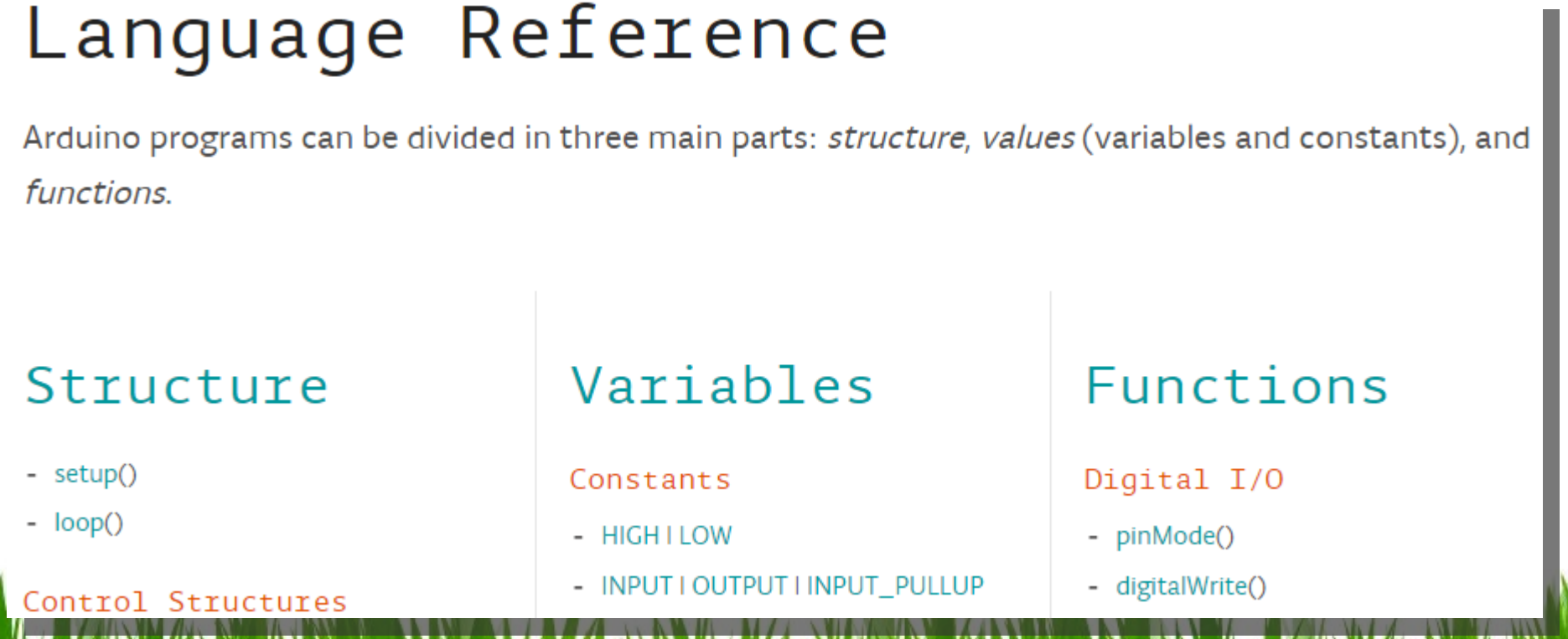
You can download the Arduino IDE (The program used to write code and uploading it to arduino boards) from:
http://arduino.cc/en/Main/Software





Arduino Reference:

Here you can learn how to program Arduino and what each code means and do, from here: http://arduino.cc/en/Reference/HomePage



https://letselectronic.blogspot.com/2015/10/1.html

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Let's Electronic

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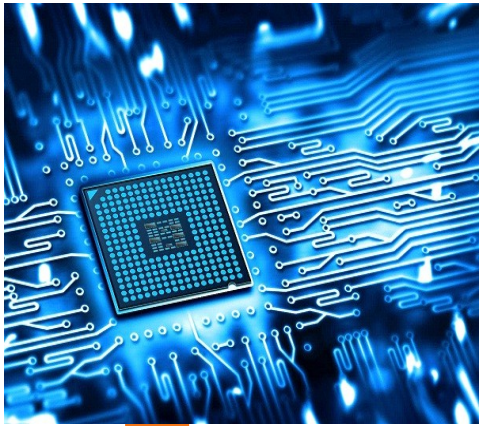
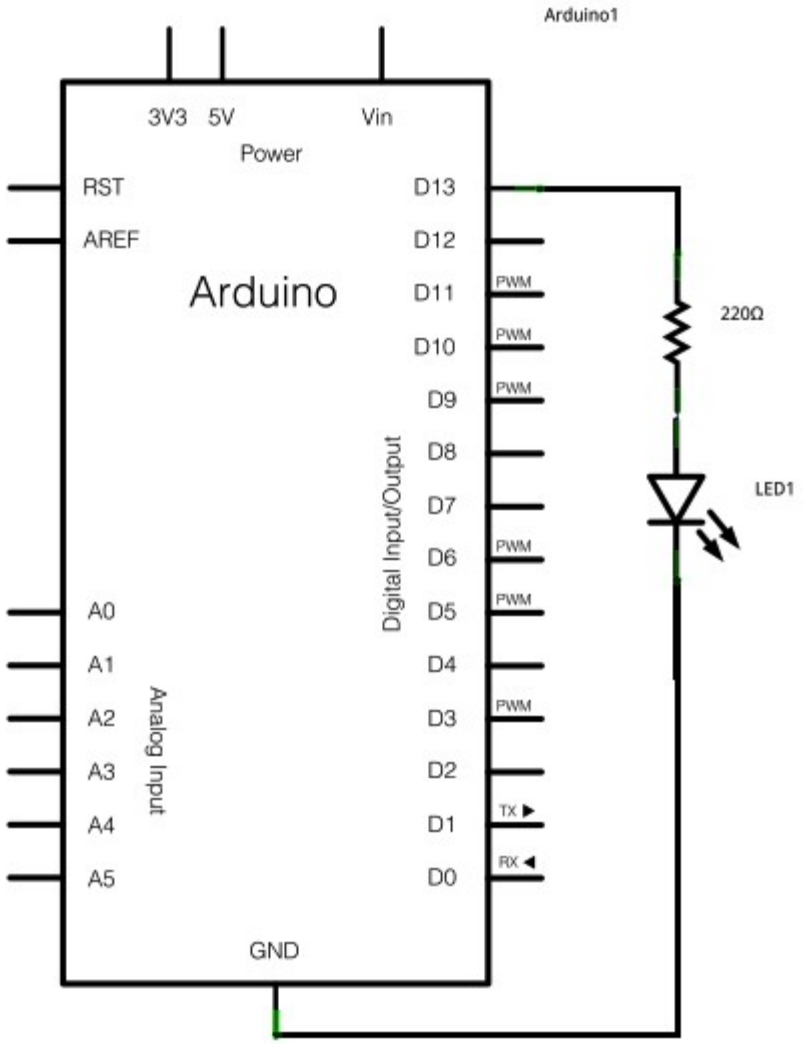
The future belongs to those who prepare for it today

Thanks for coming Aymen Lachkhem

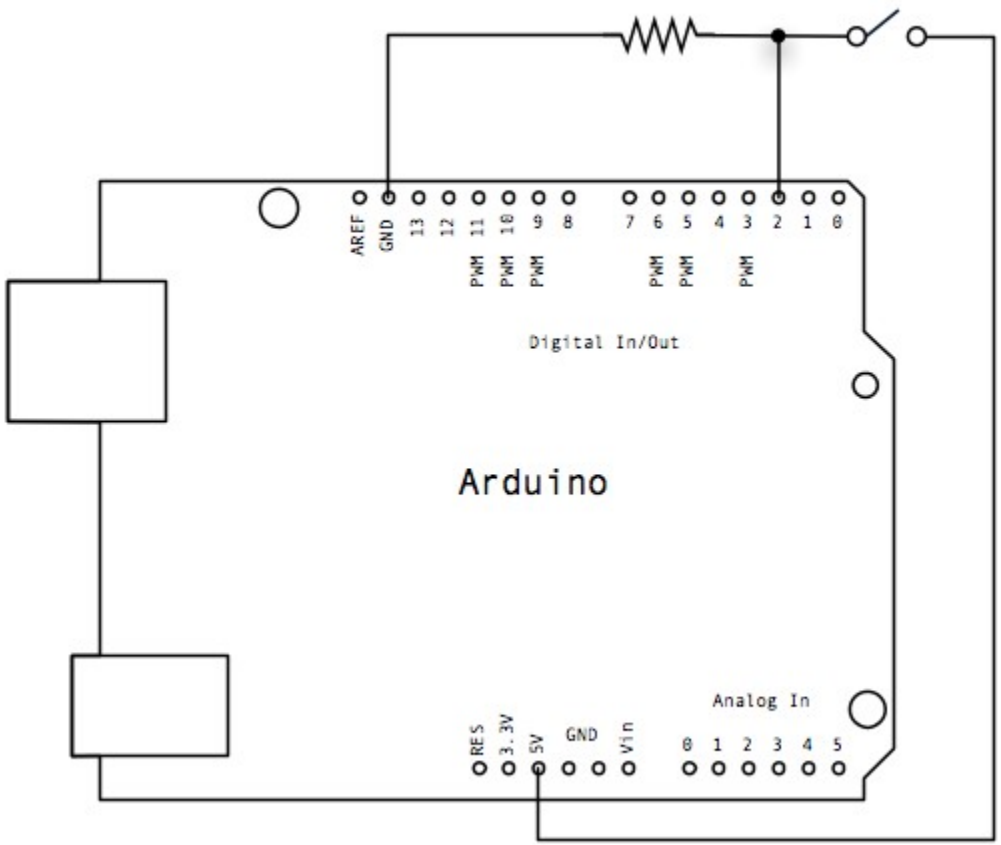


- Pour des Tutoriels visiter :
  - Mon Blog : Letselectronic.blogspot.com
  - Ma chaine Youtube : Youtube.com/c/AymenLachkhem

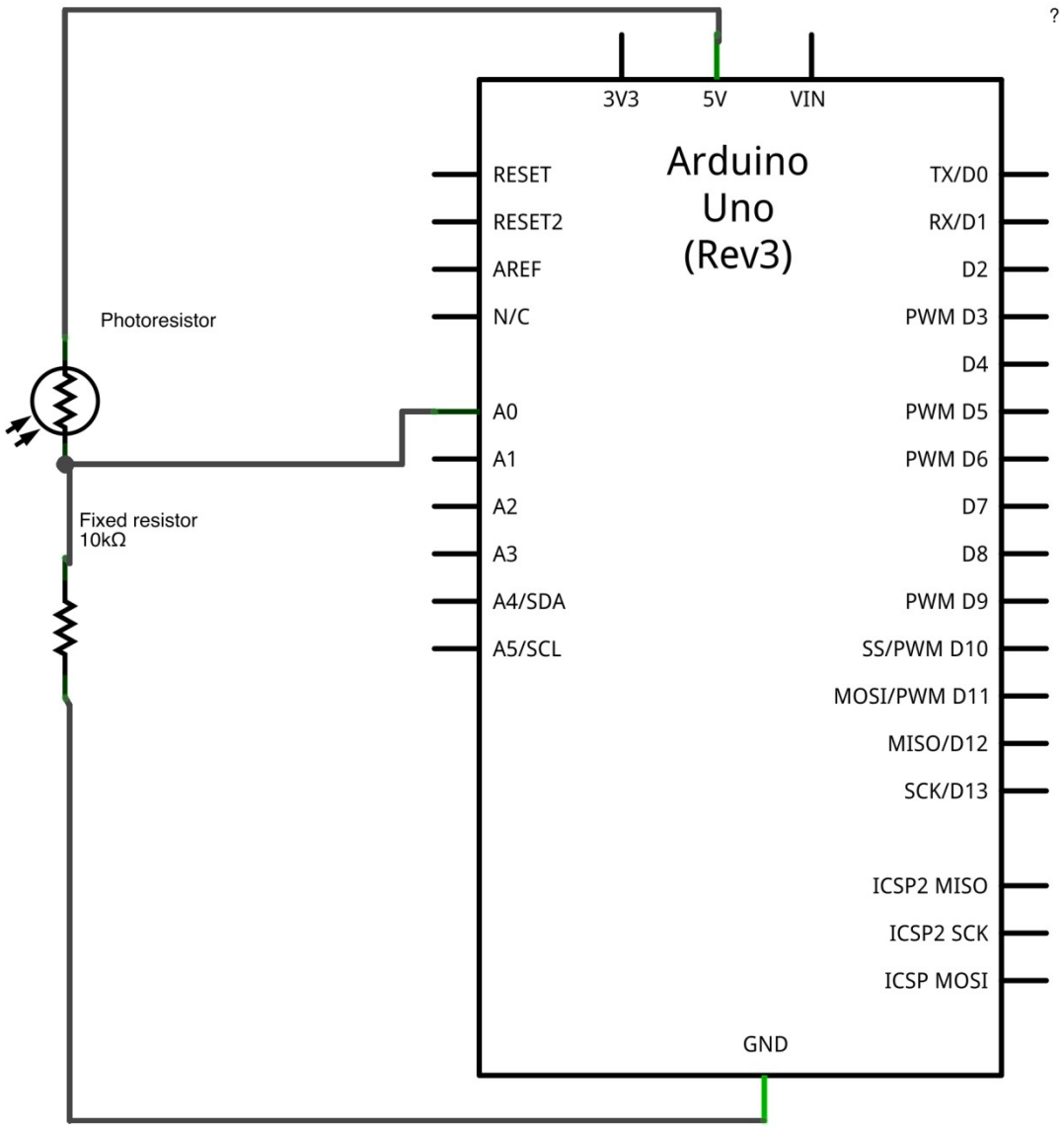
- Pour me contacter


Arduino1
3V3
5V
Vin
Power
RST
AREF
Arduino
D13
D12
D11
D10
D9
D8
D7
D6
D5
D4
D3
D2
D1
D0
PWM
PWM
PWM
PWM
PWM
TX
RX
Digital Input/Output
A0
A1
A2
A3
A4
A5
Analog Input
GND
220Ω
LED1

```
Int LED = 13 ;

void setup()
 {
  pinMode(LED_BUILTIN, OUTPUT);
}

void loop() {
  digitalWrite(LED, HIGH);
  delay(1000);
  digitalWrite(LED_BUILTIN, LOW);
  delay(1000);
}
```


AREF
GND
13
12
11
10
9
8
7
6
5
4
3
2
1
0
PWM
PWM
PWM
PWM
PWM
PWM
Digital In/Out
Arduino
Analog In
RES
3.3V
5V
GND
Vin
0
1
2
3
4
5

```
 int buttonPin = 2;
 int ledPin =  13;
void setup()
 {
  pinMode(ledPin, OUTPUT);
  pinMode(buttonPin, INPUT);
}
void loop() {

buttonState = digitalRead(buttonPin);
  if (buttonState == HIGH) {
    digitalWrite(ledPin, HIGH);
  }
Else
 {
   digitalWrite(ledPin, LOW);
  }
}
```


?
3V3
5V
VIN
Arduino
Uno
(Rev3)
RESET
RESET2
AREF
N/C
A0
A1
A2
A3
A4/SDA
A5/SCL
TX/D0
RX/D1
D2
PWM D3
D4
PWM D5
PWM D6
D7
D8
PWM D9
SS/PWM D10
MOSI/PWM D11
MISO/D12
SCK/D13
ICSP2 MISO
ICSP2 SCK
ICSP MOSI
GND
Photoresistor
Fixed resistor
10kΩ
Made with Fritzing.org

```
int sensorPin = A0;
int sensorValue = 0;

void setup() {
Serial.begin(9600);
pinMode(A0, INPUT);
}
void loop() {
sensorValue = analogRead(sensorPin);
Serial.println(sensorValue);
delay(100);
}
```