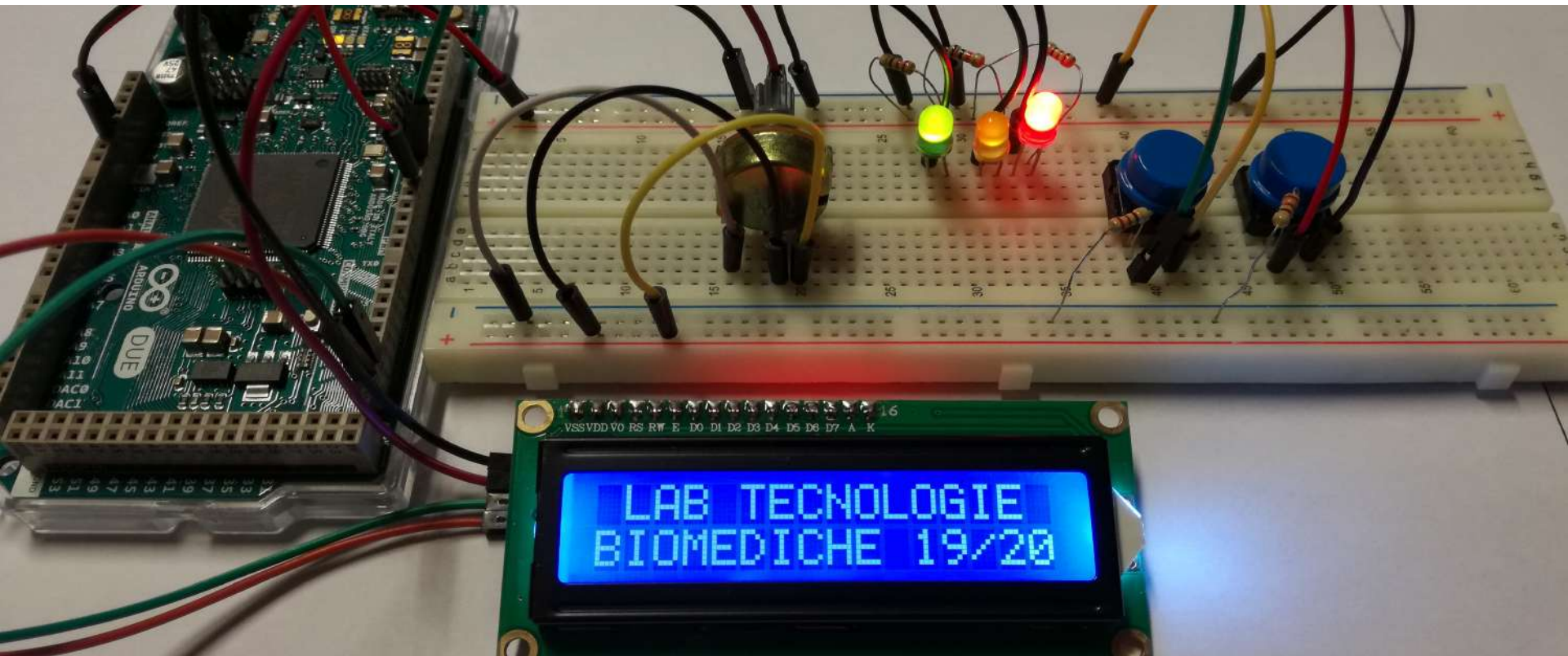# Electronic Prototyping
## Introduction to electronic prototyping
### Lesson 2
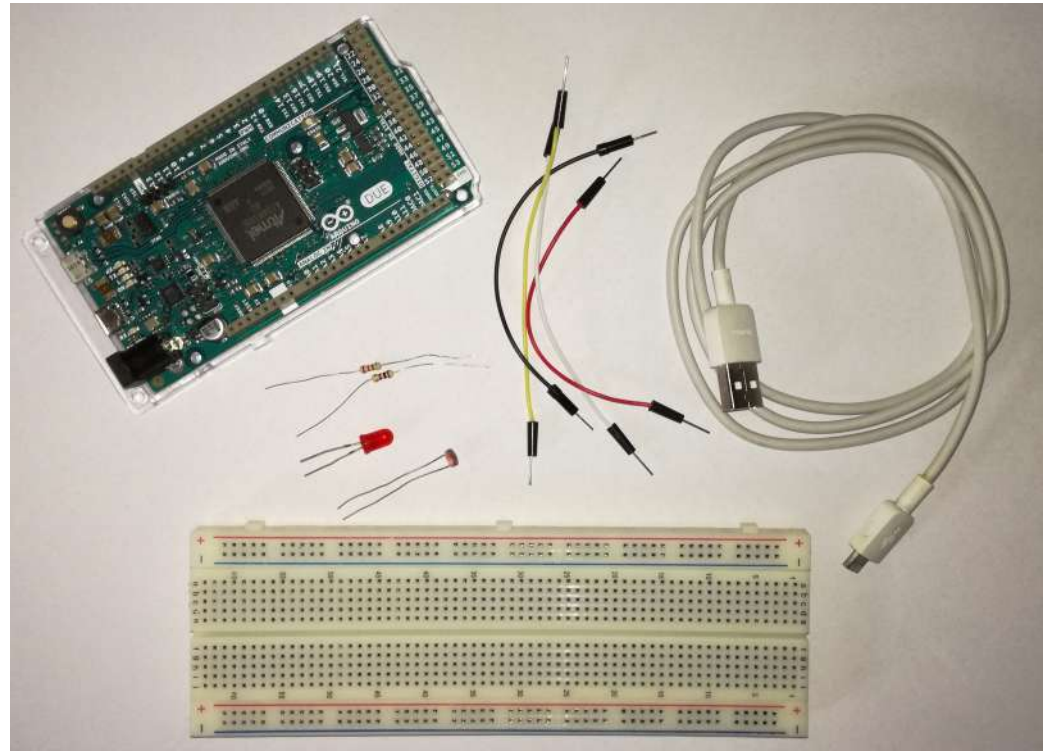
# First exercise: LED blink

# Blink LED

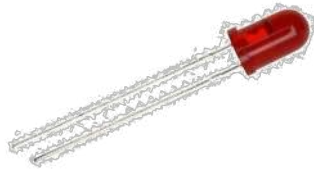**What are we going to use?**

- **Arduino DUE**
- **Breadboard**
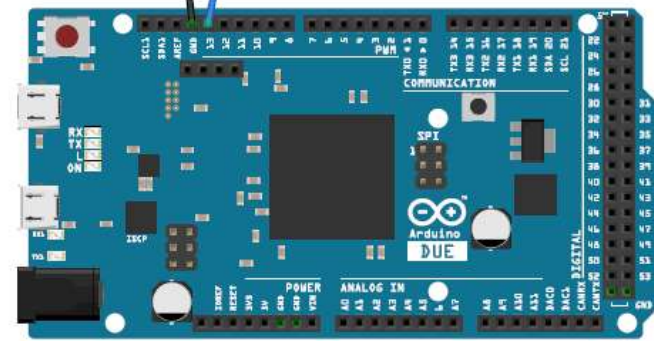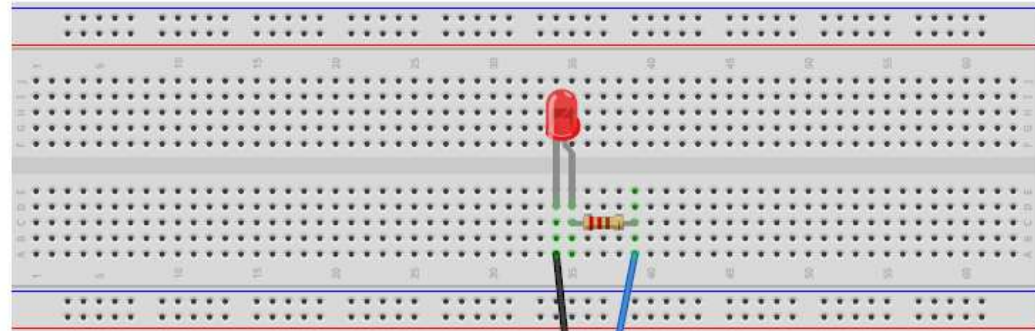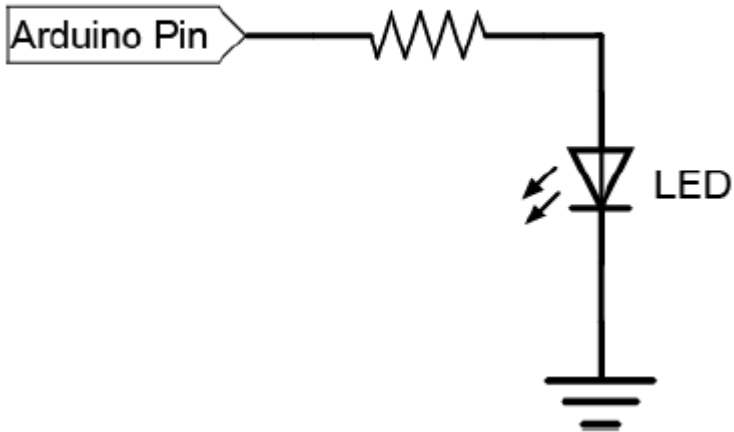- **USB Cable**
- **LED**
- **220 Ω resistance**
- **cables**

# How to connect components

**LED**

# Arduino sketch

```
int led=13;

void setup() {
  // put your setup code here, to run once:
  pinMode(led, OUTPUT);
}

void loop() {
  // put your main code here, to run repeatedly:
  digitalWrite(led, HIGH);    // turn the LED on (HIGH is the voltage level)
  delay(1000);                            // wait for a second
```

All variables must be declared before they can be used. Declaring a variable means:
- define the type of value that can assume: int, long,float, etc …
- assign a name
- and optionally assign an initial value.

# Arduino sketch

```
int led=13;

void setup() {
  // put your setup code here, to run once:
  pinMode(led, OUTPUT);
}

void loop() {
  // put your main code here, to run repeatedly:
  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
}
```

**;**    Identifies where the instruction ends

**{ ... }**    Identifies a block of instructions

Setup routine runs only ONCE when press reset

# Arduino sketch

```
void setup() {
  // put your setup code here, to run once:
  pinMode(led, OUTPUT);
}

void loop() {
  // put your main code here, to run repeatedly:
  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
}
```

Loop routine runs over and over

# Second exercise:
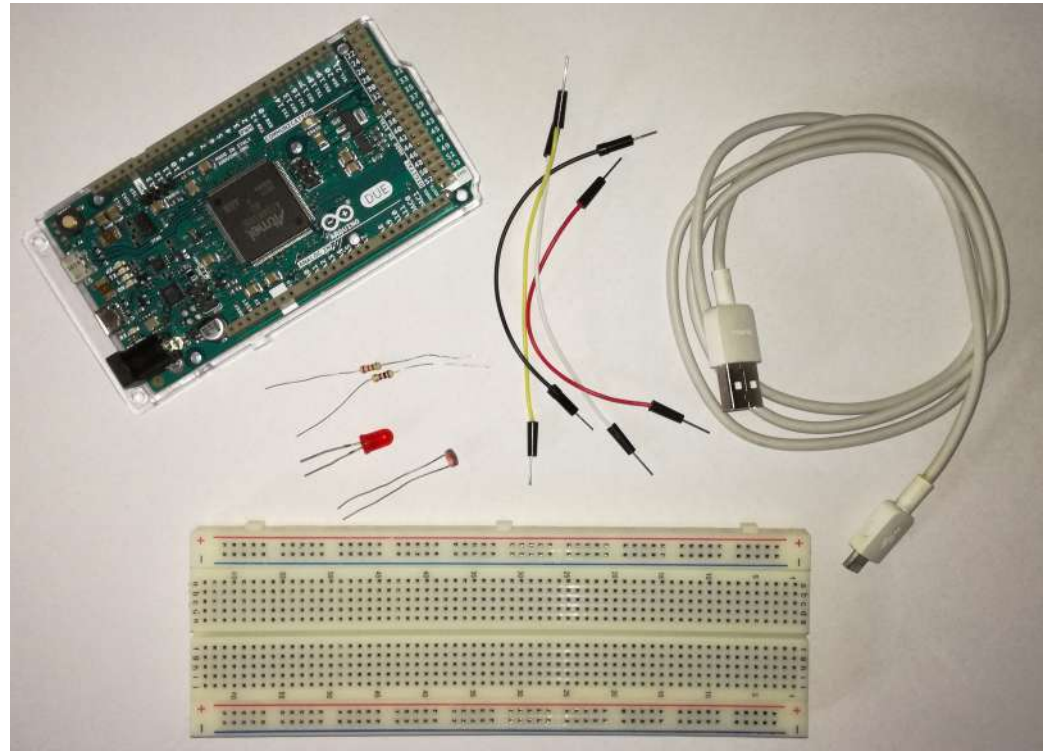# turn on a LED if there is no light

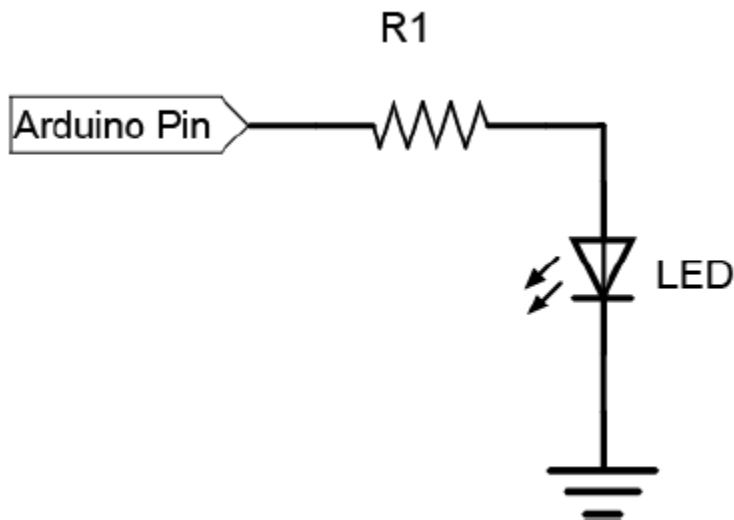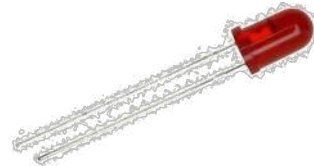# Photoresistor with LED

**What are we going to use?**

- **Arduino DUE**
- **Breadboard**
- **USB Cable**
- **LED**
- **Photoresistor**
- **10k Ω resistance**
- **220 Ω resistance**
- **cables**

# How to connect components

**LED**

**Photoresistor**

R1

Arduino Pin

LED

Vin

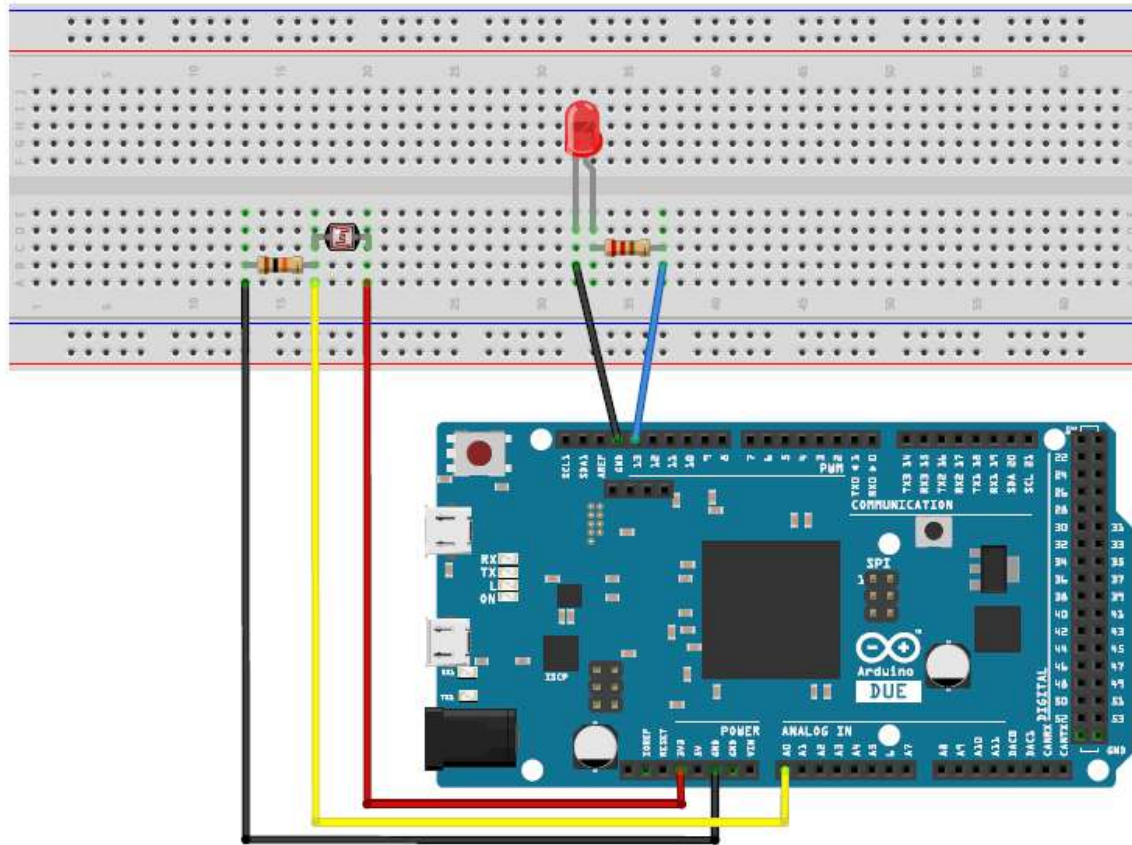Vout

Analog value

R
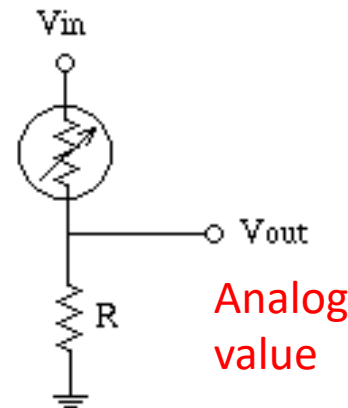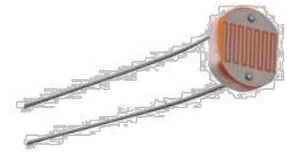
This circuit gives an output voltage that increases with the light level.

Vin

R

Vout

Analog value
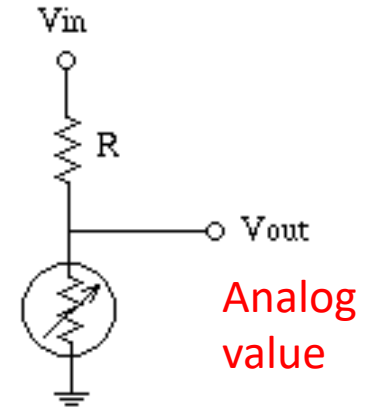
This circuit gives an output voltage that decreases with the light level.

**Find a datasheet**

# How to connect components



fritzing

# Arduino sketch

```
// define variables

int led=13;  // led connected to digital pin 13
int photoresistor;


void setup() {

  pinMode(led,OUTPUT); // initialize digital pin as an output
  Serial.begin(9600);



}
```

All variables must be declared before they can be used. Declaring a variable means:
- define the type of value that can assume: int, long,float, etc …
- assign a name
- and optionally assign an initial value.

# Arduino sketch

```
// define variables

int led=13;   // led connected to digital pin 13
int photoresistor;


void setup() {

  pinMode(led,OUTPUT); // initialize digital pin as an output
  Serial.begin(9600);



}
```

Setup routine runs only ONCE when press reset

; Identifies where the instruction ends

{
...
}
Identifies a block of instructions

**Serial.begin**();
Sets the data rate in bits per second (baud) for serial data transmission. So basically we are going to transfer 9600 bits per second to the computer.

# Arduino sketch

```
void loop() {

  photoresistor=analogRead(0);        // read the value given by photoresistor (analog pin A0)
  Serial.println(photoresistor);      // prints on the serial monitor analog values from the photoresistor
  if (photoresistor<=400){            // threshold value below which I want the led to light up
    digitalWrite(led,HIGH);           // turn on led
  }
    else{
    digitalWrite(led,LOW);            // turn off led
  }
delay(250);   // repeat reading every 250 ms
}
```

Loop routine runs over and over

If/else structure

Syntax

```
if (condition1) {
  // do Thing A
}
else if (condition2) {
  // do Thing B
}
else {
  // do Thing C
}
```

# Arduino sketch