# An introduction into Arduino programming

### 1: the Arduino Uno board

<https://www.youtube.com/watch?v=09zfRaLEasY>

1. How many digital ports are available?
2. How many analog ports are available?
3. What’s the difference between both ports?

### 3: Getting used to the IDE

<https://www.youtube.com/watch?v=YDkdVZ7e3OY>

1. Where do you find the information in which line your cursor is?
2. What means IDE? If you do not know ask google ;-)

### 4: Syntax

<https://www.youtube.com/watch?v=AJkEQ9t4WfY>

1. How can you insert comments into your source code?
2. What is the difference between the two methods “setup” and “loop”?

### 5: An introduction into variables:

[www.youtube.com/watch?v=QNTaQ5qjniE&t](http://www.youtube.com/watch?v=QNTaQ5qjniE&t)

Which Arduino datatypes were mentioned and what can you store in them?

1. Go to the Arduino reference <https://www.arduino.cc/reference/en/> and look for the datatype “boolean”. What kind of values can you store in variables from the datatype boolean?
2. Which of the following variables are declared and initialised in the correct way?

int red\_led = 5; int redLED = 5; int redLed = 5; int RedLed = 5;

1. What is the difference between declaring and initialising a variable?

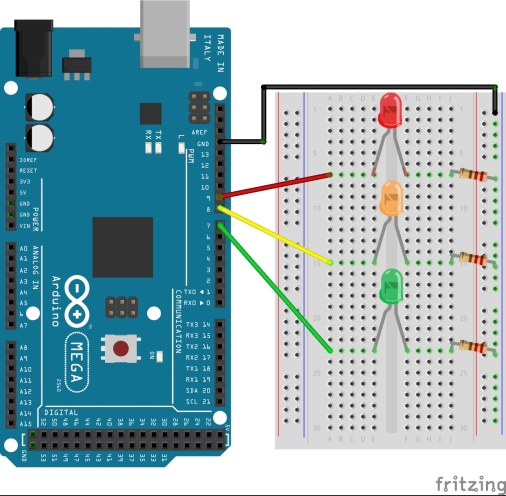
### blinkende_led6a: Blinking LED

<https://www.youtube.com/watch?v=33sNhlekRV8&>

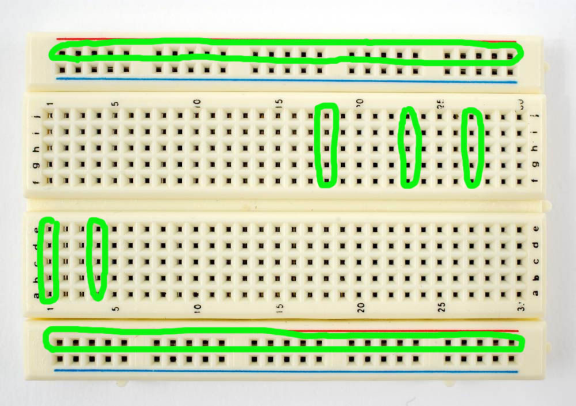
Use your breadboard to build the following circuit and use the code from Examples -> Basics -> Blink in order to let the LED blink.

1. Decrease the delay in order to get a higher blinking frequency. Can you calculate the frequency when your eyes are no more able to distinguish the flickering?

### 6b: Traffic light

Modify the “blink” program to realise a traffic light.

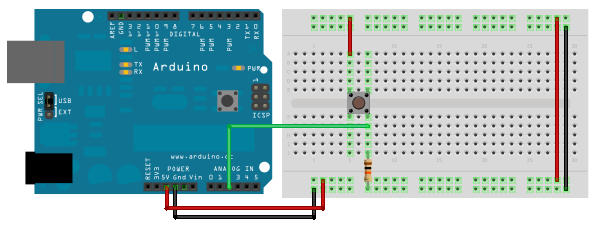
Remember how the breadboard is connected internally:



### 7: Read values and print data on the computer’s screen

<https://www.youtube.com/watch?v=CIrN2CaO6bo>

Build the following circuit (you can also use a digital port as INPUT) and detect the state of the button (pressed or not). Print the state using the serial monitor.

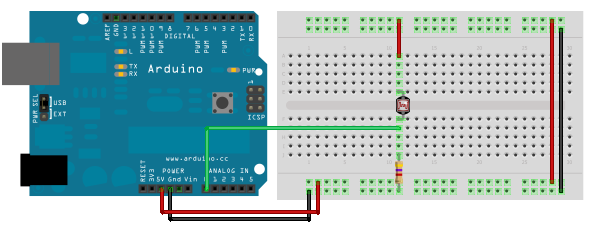


1. Now insert a cable into your INPUT pin and play around with it while you are observing the detected value. What happens with the value from time to time?

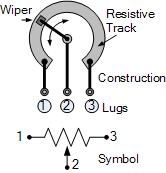
### 8: Read “analog” values

[www.youtube.com/watch?v=CPMQSXrsaO8&t](http://www.youtube.com/watch?v=CPMQSXrsaO8&t)

Build one of the following circuit using a potentiometer or an LDR (**l**ight **d**ependent **r**esistor), read the value and print it using Serial.print(…).

1. Can you imagine how a potentiometer works?



And here’s the idea behind both circuits (the same way you can also measure temperatures using NTC resistors (ask your teacher for one)):

1. What is the maximum range of the values of an analog port?
2. Optional idea for a project: the darker it is the brighter a light shall shine. Use an LED and an LDR.
3. Optional: Measure a voltage using AnalogRead(): <https://www.youtube.com/watch?v=_H16GYL08Ik>

**Congratulations**, well done so far!

### 9: AnalogWrite (PWM – pulse with modulation)

Watch <https://www.youtube.com/watch?v=wpTqiEcHwwQ> and let a LED “fade”.

1. Explain PWM: What does a 50% duty cycle mean?
2. Can you explain the operators “= =” and “| |”?