

Programming an Arduino Uno board with Scratch4Arduino

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In this reference an Arduino Uno board and electronic devices from the Bausteln beginner's set¹ are used. The color coding for the wires is:

green: current – **blue: ground** – **yellow: input signals**

1.1 Connecting devices to the Arduino Uno board

The Arduino Uno board features 6 analog input pins. The 14 digital pins of the Arduino Uno board can be used both as input and output pins distinguishing between high and low values. 6 pins (pins 3, 5, 6, 9, 10 and 11) can also be used to write an analog output of an 8-bit value ranging from 0 to 255 using pulse width modulation (PWM), these pins are marked with a wave symbol (~). Scratch4Arduino (S4A), however, needs to introduce restrictions on how the different pins are to be used. Here is an overview:

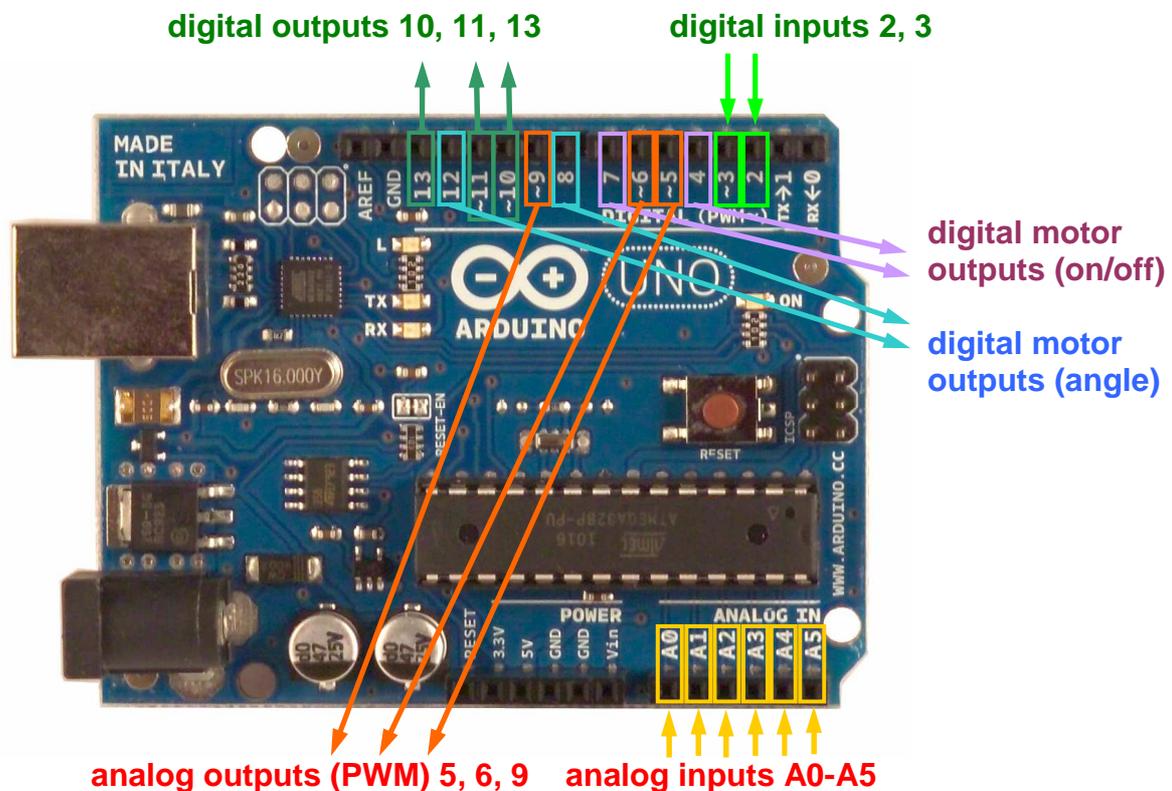


image source: <http://arduino.cc/en/uploads/Main/ArduinoUnoFront.jpg>

The „breadboard” connects in the following way:

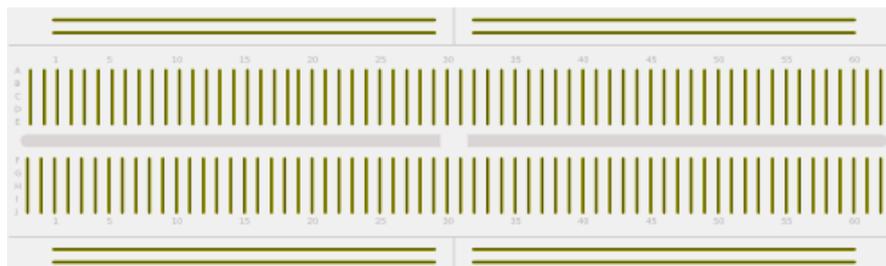


image source: http://bausteln.de/wp-content/uploads/2009/02/steckplatine_innen.png

¹ <http://bausteln.de/anleitungen/arduino/einsteigerset/>

1.1.1 Two ways of controlling an LED

The longer leg of an LED (anode) should be connected to the current using a resistor. The resistor protects the LED of a too high current and from taking damage in case the LED is accidentally connected the wrong way.

LEDs can be controlled by the digital output pins 10, 11 or 13.

commands:

- `digital 10 on` turns on the LED connected to pin 10
- `digital 10 off` turns off the LED connected to pin 10

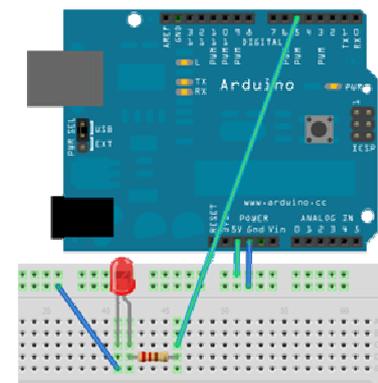
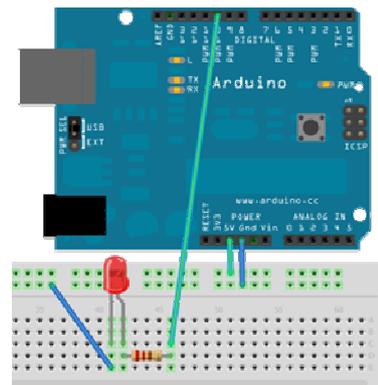
Use a 150 Ω resistor [**brown-green-brown**] for the LED.

Alternatively, an LED's brightness can be controlled by the analog output pins 5, 6 or 9.

command:

- `analog 5 value 128` sets the current for the LED connected to pin 5 to the specified fraction of 255 (e.g. 128 would cause the LED to receive half the current)

Use a 150 Ω resistor [**brown-green-brown**] for the LED.



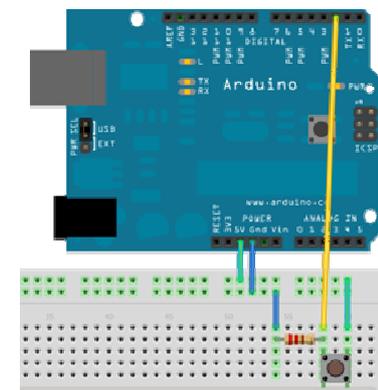
1.1.2 Reading a switch value

Switches can be connected to pins 2 or 3.

command:

- `sensor Digital2 pressed?` checks, whether the switch connected to pin 2 is pressed or not. Returns „true“ if the switch is pressed and „false“ otherwise.

Use a 10 k Ω resistor [**brown-black-orange**] for the switch.

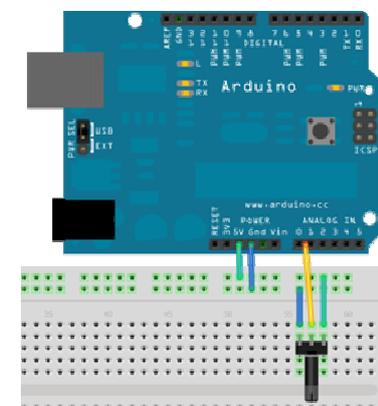


1.1.3 Reading a potentiometer value

A potentiometer is an adjustable resistor. It can be used to control values ranging from 0 to a maximum. A potentiometer can be connected to the analog input pins A0 through A5.

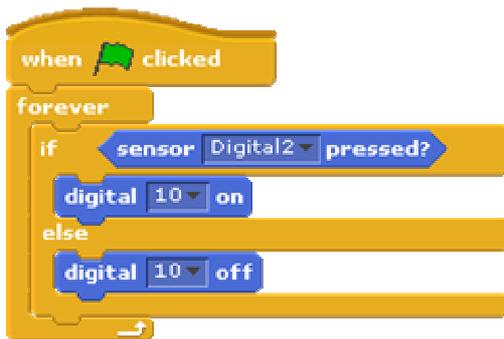
command:

- `value of sensor Analog0` reads the value of the potentiometer connected to pin A0

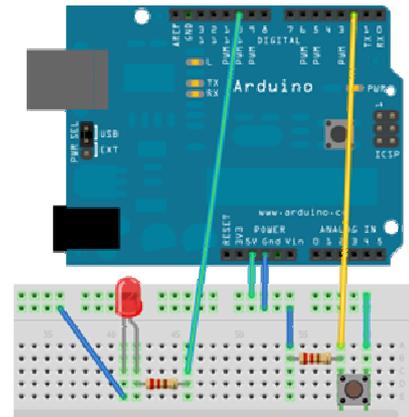


1.2 Examples

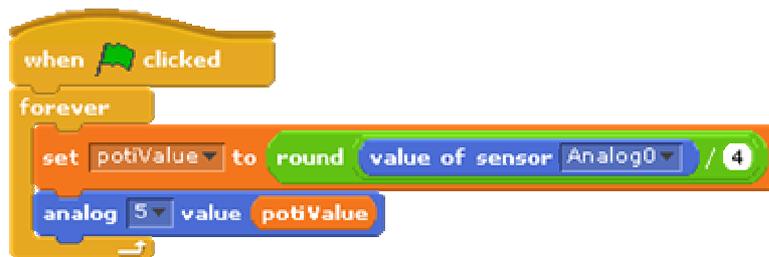
Control an LED through a switch:



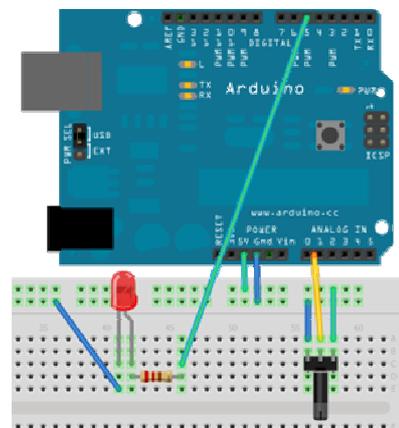
Use a 10 k Ω resistor [brown-black-orange] for the switch.
Use a 150 Ω resistor [brown-green-brown] for the LED.



Control an LED's brightness through a potentiometer:



Use a 150 Ω resistor [brown-green-brown] for the LED.



1.3 Links

Scratch4Arduino: <http://seaside.citilab.eu/scratch/arduino/>

Arduino: <http://arduino.cc>

The images were created using ...

Fritzing: <http://fritzing.org>