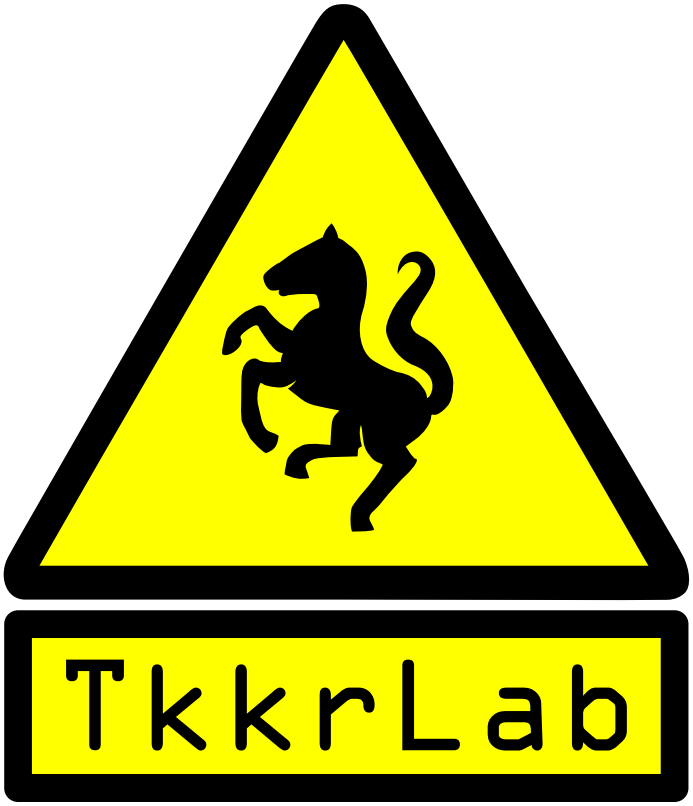


Workshop Arduino for beginners

by TkkrLab
Enschede

Tkkrlab

TkkrLab (Tukkerlab) exist of a group of people that are interested in technology, digital technic and science. We come together every tuesday in our space where we work together with our projects or just hang out and chatting with a Club-mate to drink.

We also have our workplace where you can solder and build your projects. Also we give workshops and lectures about subjects as Arduino, opens source software en linux.

For more info look on our site tkkrlab.nl or follew us on twitter (@tkkrlab) or facebook.

Arduino

Arduino is A open source electronic prototyping unit based on flexible, easy to use hardware and software. It's meant for artist, designers, hobby and everyone interested in making interactive objects and environments.

Where going to build A simple design with the Arduino to drive 8 leds (little lights).
And build some code to blink the leds in any way we want to.

The use of an arduino always needs 2 steps.

1. Building the hardware
2. Writing the software.

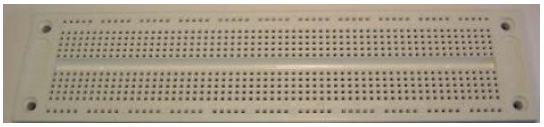
In this workshop we start building the hardware we need. After that we will write different programs to show you that with the same hardware different things can be made.

Step 1: The arduino hardware

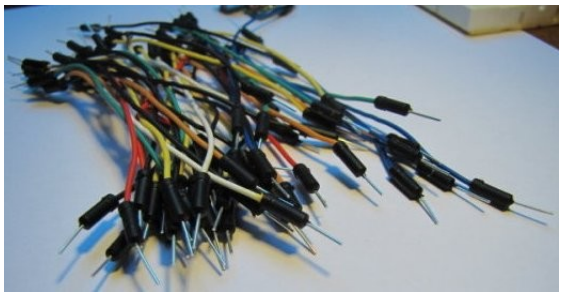
For this workshop we need this hardware:

8 leds (random color):

8 resistors 1 kilo ohm (color code: brown black red) :



1 breadbord



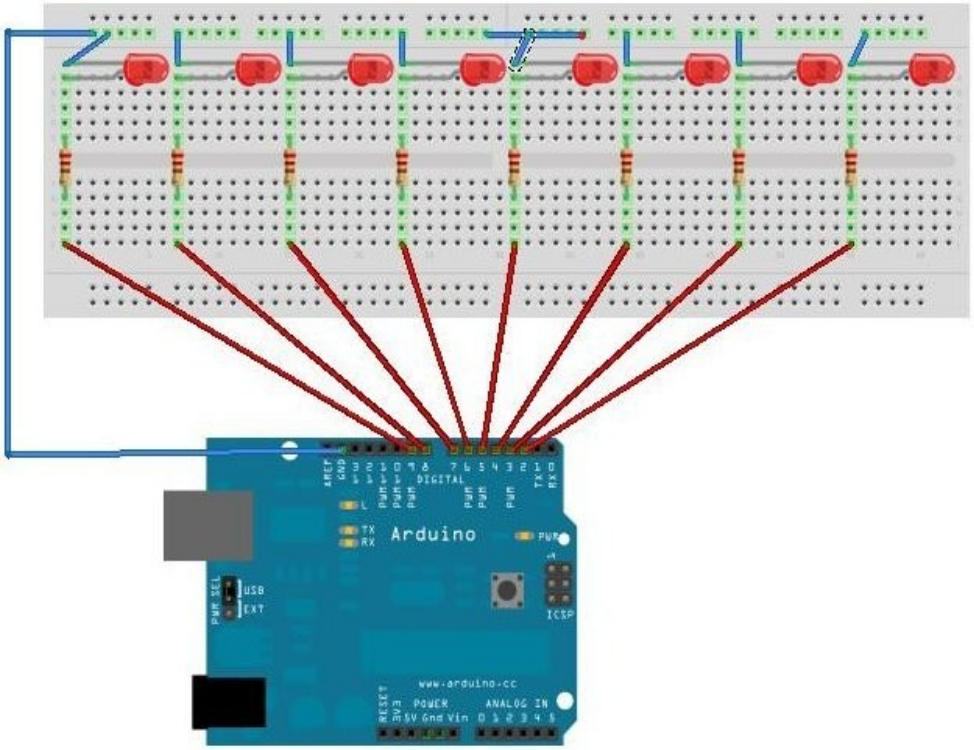
110 breadboard wires:: 8 short of one color and 1 short and long in a other color.

1 Arduino

Be aware: These components are put together by us, please check if everything is there before and after the workshop

Building the hardware:

Whit these components where gonna build A circuit.
The schematic of our circuit looks like this:



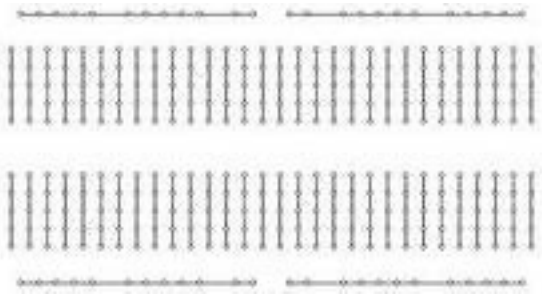
The breadboard

As you see this workshop uses A breadboard.

These breadboards are made in different formats and by different suppliers.
The breadboard where going to use is A simple version en doesn't comply with the one on the picture
As you see in the schematic above whe will be using 1 row off ground line on top of the board so this is no problem for our design.

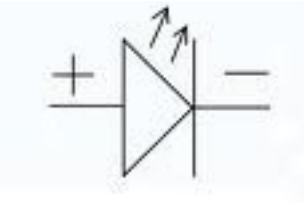
A breadboard is made for prototyping, it's an easy way to connect parts together and test your designs.

The internal connections of the breadboard
are shown in this picture:

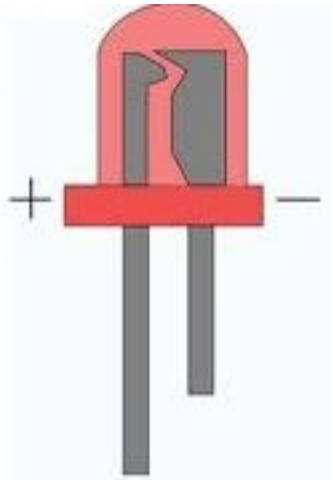


You start with mounting the leds on the breadboard :

This is the sign of A led drawn in A normal electronic circuit:



Here we see that A led has an positive and A negative pole.
The longest pin is the positive pole of the led.

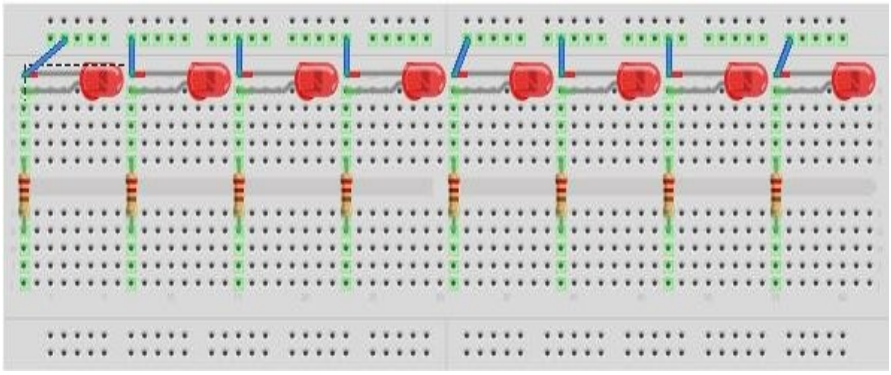


In our design the longest pin of the led + has to be in the direction of the resistor and the shortest pin – has to be on the negative connection on top of the breadboard

Now where gonna mount the resistors:
I A schematic A resistor is drawn like this:

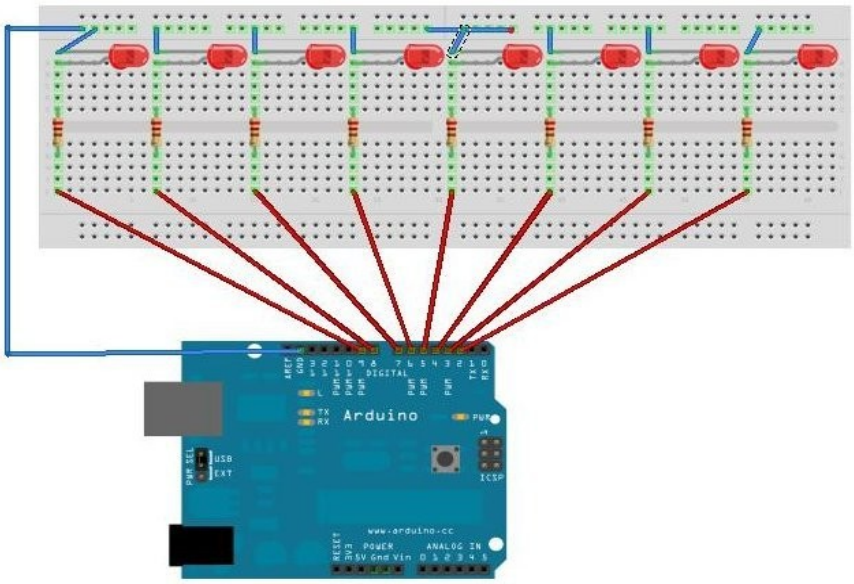
There is no positive or negative pole on A resistor so you can mount it as you like.

Our Bord should look like this now:



Now where gonna connect the arduino:

Whit the breadboard wires we make connections like this:



Start with the 8 same color wires and connect them starting with pin 2 of the arduino to the most right resistor.
Then pin 3 to the next resistor etc until you reach pin 9.
Then connect the long wire from the GND of the Arduino to the negative connection of the breadboard.
The last othet color wire is to connect the gap in the breadboard at the negative pole.

Your circuit is now finished.

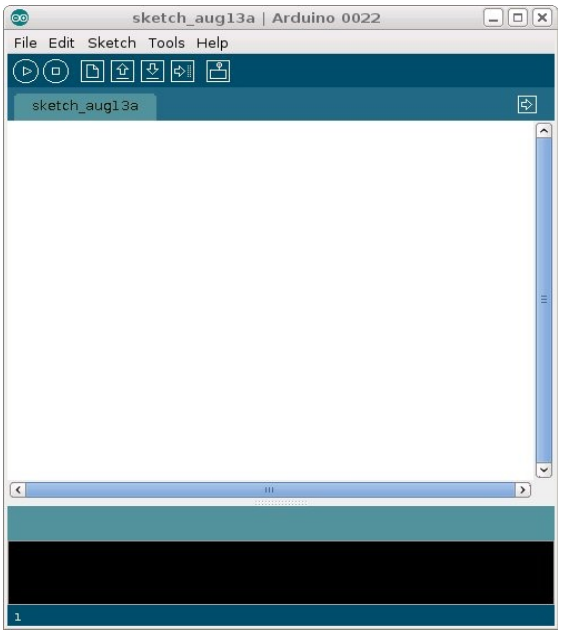
Ask one of our volunteers to check you circuit and power it up.

Step 2: The arduino software

For the software part we need :

A programming cable (USB-B)

A laptop or pc with usb connetion



AArduino software (get it from http://arduino.cc/en/Main/Software)
On our laptops this is already pre installed.

Assignment 1:

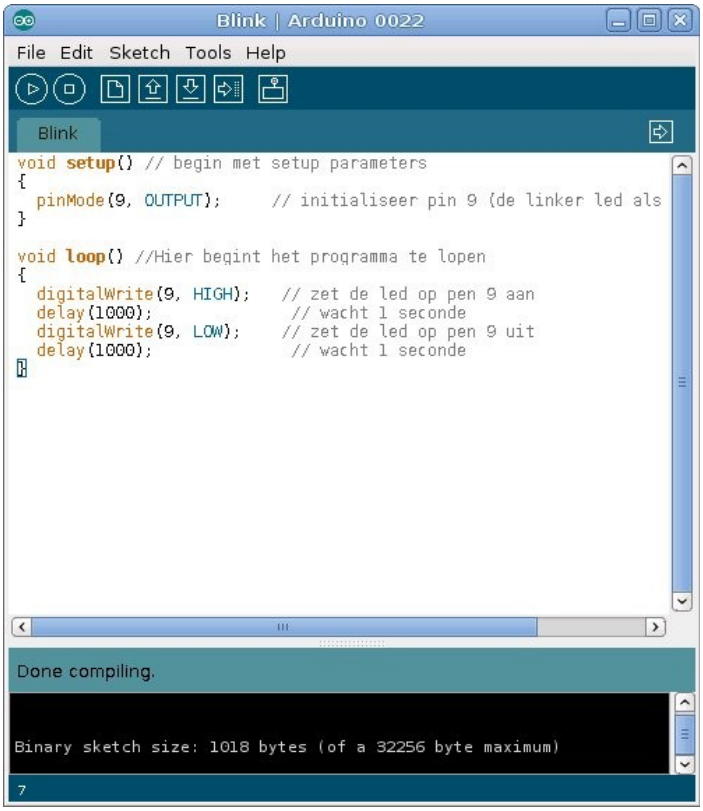
We start with A simple program you have to type over to the arduino software
All text after the // are not used and only for information to the reader of the software:
I use this option to explain the steps in the program.

```
void setup() // begin with setup parameters
{
  pinMode(9, OUTPUT); //init pin 9 (the left led as output pin).
}

void loop() //Here the program start to run
{
  digitalWrite(9, HIGH);   // turn on led 9 on pin
  delay(1000);             // wait 1 sec.
  digitalWrite(9, LOW);    // turn of led on pin 9
  delay(1000);             // wait 1 sec.
}
```

Test this program with the compile button

If you did everything well it should look like this.



Now where going to upload your software to the arduino hardware.

Connect your arduino to the laptop with the USB cable and press upload 

If everything goes well the first led (connected to pin 9 should blink).
If there is something wrong with the upload proces please ask A volunteer the assist you.

Assignment 2:

Where gonna workout A different program now:

Push the new button: 

You get an empty screen, start typing over this code.

```
void setup() //begin with setup parameters
{
  pinMode(9, OUTPUT);// init pin 9 (the left led as output pin).
  pinMode(8, OUTPUT);// init pin 8 (2nd led as output)
}

void loop() //Here the program start to run
{
  digitalWrite(9, HIGH);   // turn on led 9 on pin
  delay(1000);              // wait 1 sec.
  digitalWrite(9, LOW);    // turn of led on pin 9
  delay(1000);              // wait 1 sec.
  digitalWrite(8, HIGH);   // turn on led 8 on pin
  delay(1000);              // wacht 1 seconde
  digitalWrite(8, LOW);    // turn of led on pin 8
  delay(1000);              // wait 1 sec.
}
```

Connect the arduino with the usb cable and pres upload 

Assignment 3:

Try to change the program from assignment 2 to 3 leds and upload the code to your arduino.

Assignment 4:

The next assignment where gonna download from the ttkrlab website.
Use your browser and go to http://www.tkkrlab.nl/files/opdract4.pde
If there is no internet connection this assignment will be on the desktop of your machine.

Use copy and past from to transfer this code to your arduino software.

Connect the arduino with the usb cable and push the upload button 

The end

This was the arduino workshop.
You learn t:

- working with A breadboard
- Connecting the arduino to your breadboard project.
- Write A simple program
- upload A program to an arduino.
- Change A program.
- Download A program from the internet and upload it to your arduino.

This workshop and the arduino codes can be found at
http://www.tkkrlab.nl/wiki/File:Arduino_workshop_en.pdf

Cleaning up:

Make sure your breadboard is empty again.
Look on page 3 of this workshop to see if everything is complete.
Ask A volunteer of TKKRLAB to check if everything is complete for the next workshop.

Thank for your attention.
Off course this is only the basics of the arduino.
If you want to learn more about this or other hardware and software projects please visit our TKKRLAB

Visit our website for more information http://www.tkkrlab.nl

By: Marco Geels / layout: Dave Borghuis