

Übungen zur TI

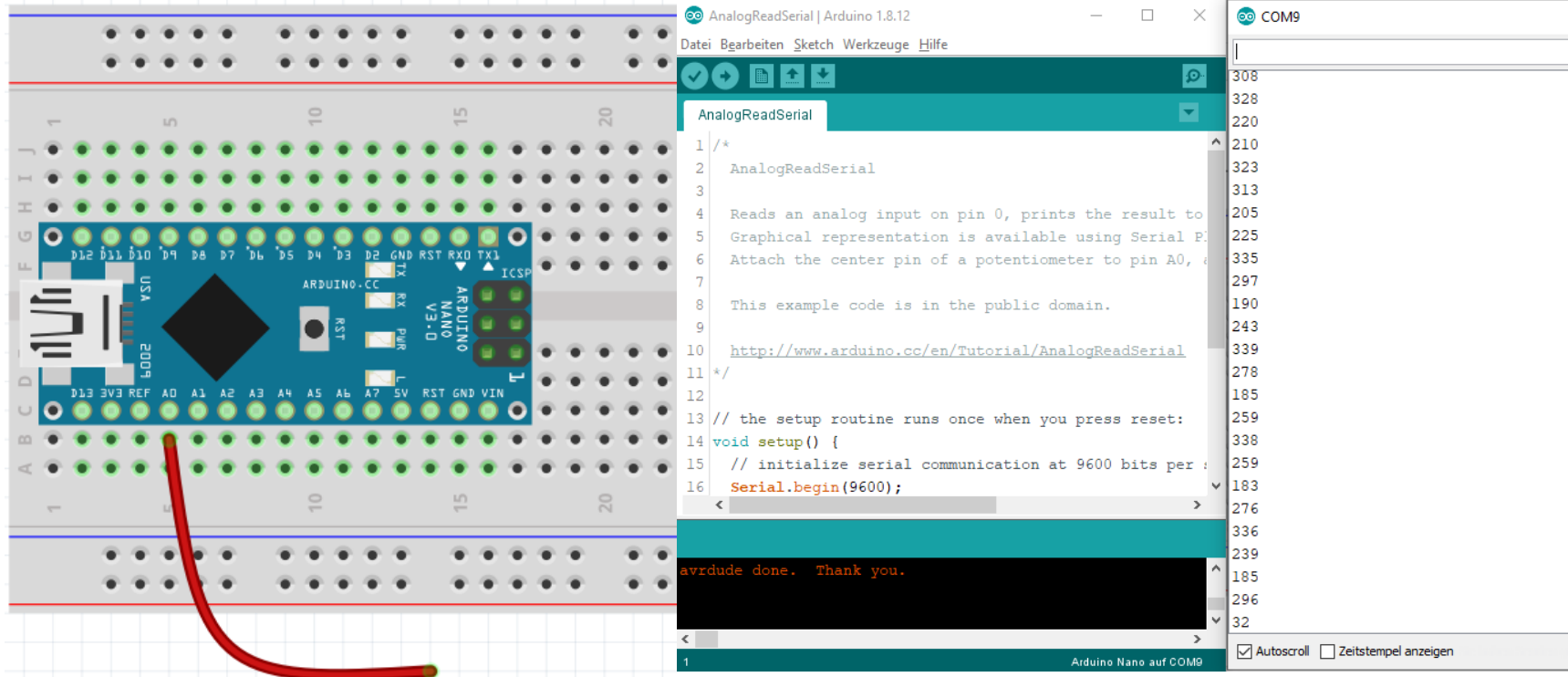
3. Übung

Inhalt

- Zusammenfassung der letzten Woche
- Verbesserung der Hausaufgabe
- AnalogReadSerial
 - Pull up
 - Pull down
 - Spannung messen
 - Widerstand messen
- Button
- DigitalInputPullup
- Testat

AnalogReadSerial

<https://www.arduino.cc/en/Tutorial/BuiltInExamples/AnalogReadSerial>



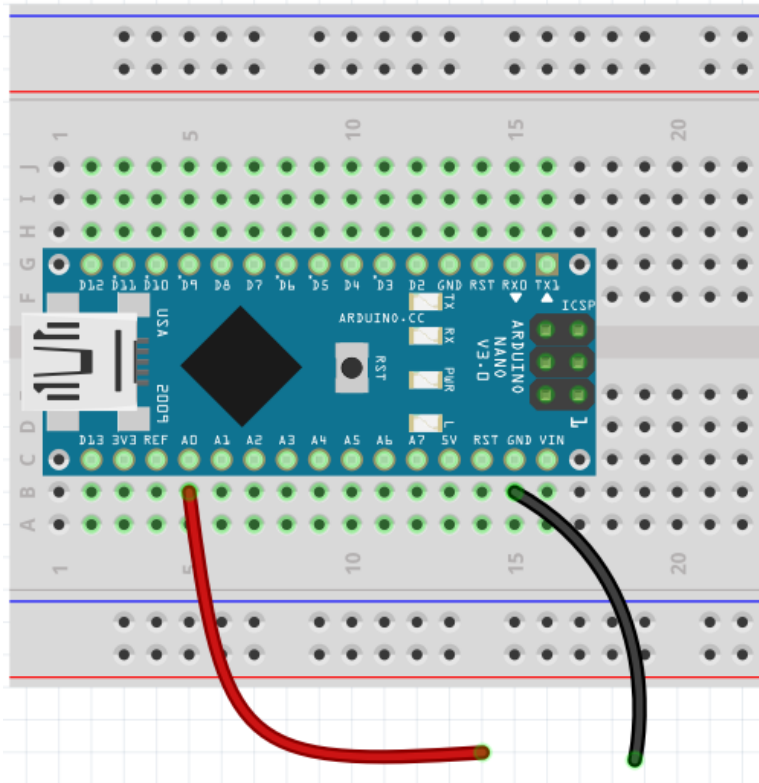
The image shows an Arduino Nano board connected to a breadboard. A red wire is connected to the A0 pin. The Arduino IDE window displays the 'AnalogReadSerial' sketch. The code is as follows:

```
1 /*
2  AnalogReadSerial
3
4  Reads an analog input on pin 0, prints the result to the serial monitor.
5  Graphical representation is available using Serial Plotter.
6  Attach the center pin of a potentiometer to pin A0, one end to GND and
7  the other to 5V.
8
9  This example code is in the public domain.
10
11 http://www.arduino.cc/en/Tutorial/AnalogReadSerial
12 */
13 // the setup routine runs once when you press reset:
14 void setup() {
15   // initialize serial communication at 9600 bits per second:
16   Serial.begin(9600);
17 }
```

The serial monitor (COM9) shows the output: `avrdude done. Thank you.`

AnalogReadSerial

<https://www.arduino.cc/en/Tutorial/BuiltInExamples/AnalogReadSerial>



The image shows an Arduino Nano board connected to a breadboard. A potentiometer is connected to the breadboard. The center pin of the potentiometer is connected to Arduino pin A0. The outer pins of the potentiometer are connected to the 5V and GND pins of the Arduino Nano. A red wire connects the 5V pin to the breadboard's power rail, and a black wire connects the GND pin to the breadboard's ground rail.

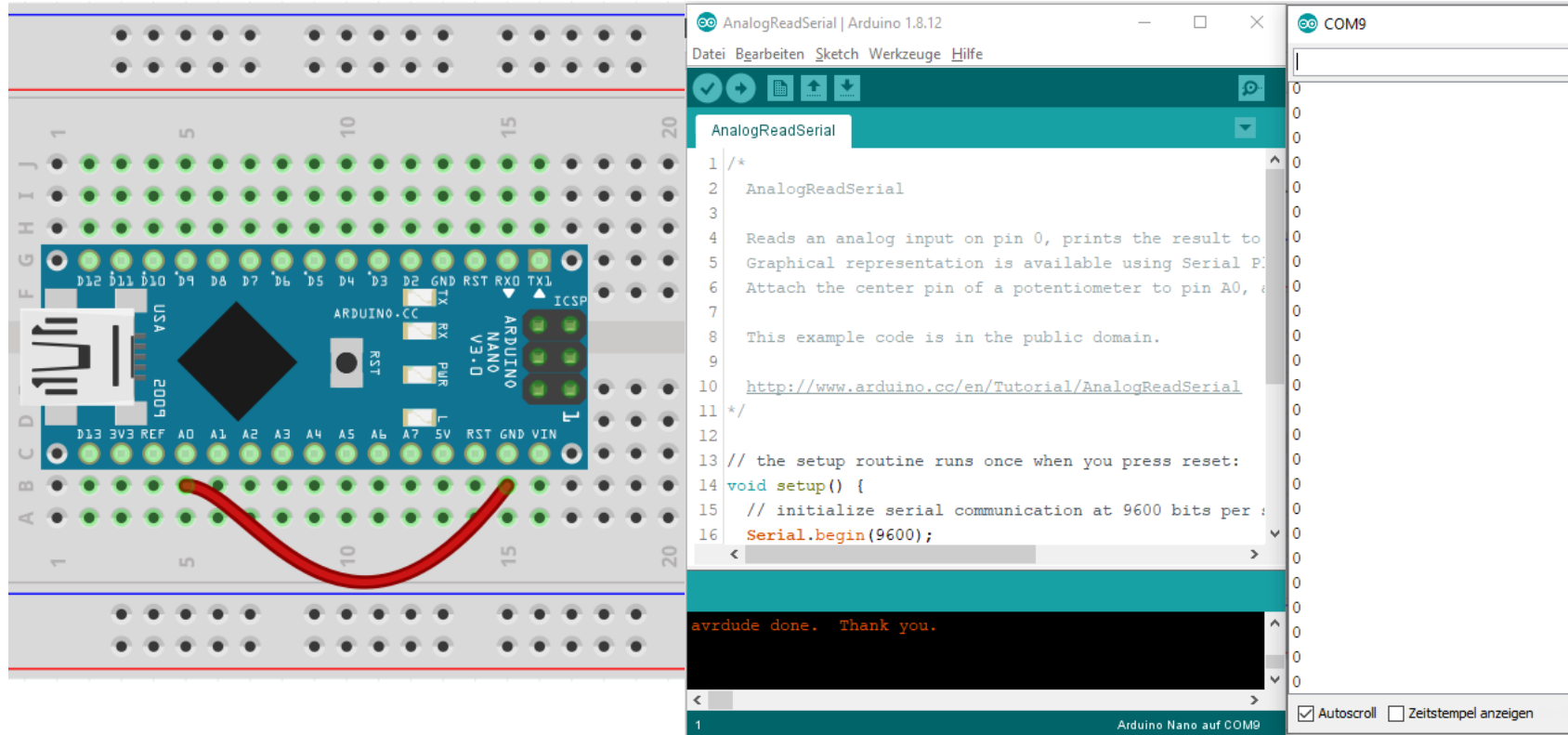
The right side of the image shows the Arduino IDE interface. The window title is "AnalogReadSerial | Arduino 1.8.12". The menu bar includes "Datei", "Bearbeiten", "Sketch", "Werkzeuge", and "Hilfe". The toolbar contains icons for file operations and a search icon. The code editor shows the following code:

```
1 /*
2  AnalogReadSerial
3
4  Reads an analog input on pin 0, prints the result to
5  Graphical representation is available using Serial Plotter.
6  Attach the center pin of a potentiometer to pin A0, and
7
8  This example code is in the public domain.
9
10 http://www.arduino.cc/en/Tutorial/AnalogReadSerial
11 */
12
13 // the setup routine runs once when you press reset:
14 void setup() {
15   // initialize serial communication at 9600 bits per second:
16   Serial.begin(9600);
17 }
```

The serial monitor shows the output: "avrdude done. Thank you." The status bar at the bottom indicates "Arduino Nano auf COM9" and has checkboxes for "Autoscroll" and "Zeitstempel anzeigen".

AnalogReadSerial

<https://www.arduino.cc/en/Tutorial/BuiltInExamples/AnalogReadSerial>



The image displays an Arduino Nano board connected to a breadboard. A red wire is connected between the breadboard and the board's pins. The Arduino IDE interface is shown, displaying the code for the AnalogReadSerial example. The code is as follows:

```
1 /*
2  AnalogReadSerial
3
4  Reads an analog input on pin 0, prints the result to
5  the serial monitor. Graphical representation is available using Serial Plotter.
6  Attach the center pin of a potentiometer to pin A0, and
7  the outside pins to +5V and ground.
8
9  This example code is in the public domain.
10
11  http://www.arduino.cc/en/Tutorial/AnalogReadSerial
12 */
13 // the setup routine runs once when you press reset:
14 void setup() {
15   // initialize serial communication at 9600 bits per second:
16   Serial.begin(9600);
17 }
```

The terminal output shows the message: `avrdude done. Thank you.`

The IDE window title is "AnalogReadSerial | Arduino 1.8.12". The terminal window title is "COM9". The IDE status bar at the bottom indicates "Arduino Nano auf COM9".

AnalogReadSerial

<https://www.arduino.cc/en/Tutorial/BuiltInExamples/AnalogReadSerial>

⋮ ✕ ✓ <i>fx</i> =B4*C3/B3		
B	C	D
1024	5	
500	2,44	

⋮ ✕ ✓ <i>fx</i> =B4*C3/B3		
B	C	D
1024	5	
500	=B4*C3/B3	

AnalogReadSerial

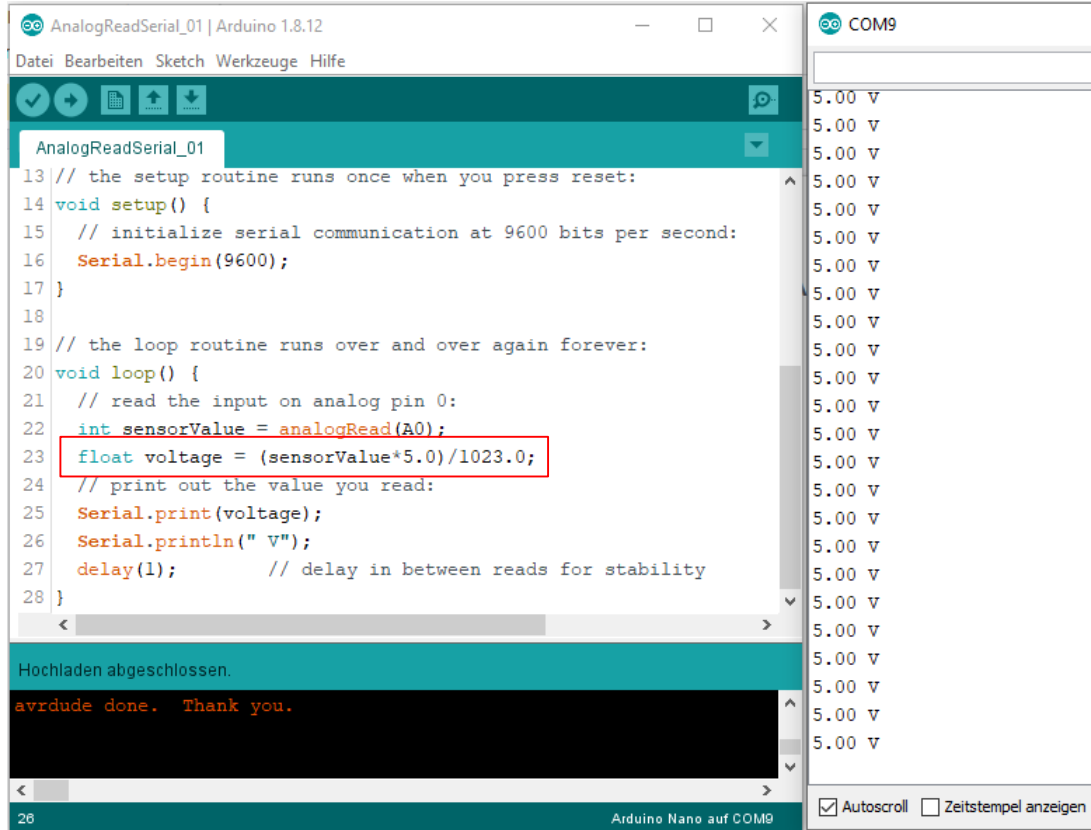
<https://www.arduino.cc/en/Tutorial/BuiltInExamples/AnalogReadSerial>

The image shows the Arduino IDE interface with a sketch named 'AnalogReadSerial_01' loaded. The sketch code is displayed in the main editor window. The code includes a setup routine that initializes serial communication and a loop routine that reads the voltage from an analog sensor (AO) and prints the value to the serial monitor. The line `float voltage = (sensorValue*5)/1024;` is highlighted with a red box. The serial monitor on the right shows the output of the program, which is a constant value of 4.00 V. The IDE status bar at the bottom indicates 'Arduino Nano auf COM9'.

```
AnalogReadSerial_01 | Arduino 1.8.12
Datei Bearbeiten Sketch Werkzeuge Hilfe
AnalogReadSerial_01
13 // the setup routine runs once when you press reset:
14 void setup() {
15   // initialize serial communication at 9600 bits per second:
16   Serial.begin(9600);
17 }
18
19 // the loop routine runs over and over again forever:
20 void loop() {
21   // read the input on analog pin 0:
22   int sensorValue = analogRead(A0);
23   float voltage = (sensorValue*5)/1024;
24   // print out the value you read:
25   Serial.print(voltage);
26   Serial.println(" V");
27   delay(1);    // delay in between reads for stability
28 }
Hochladen abgeschlossen.
avrdude done. Thank you.
23 Arduino Nano auf COM9
 Autoscroll  Zeitstempel anzeigen
```


AnalogReadSerial

<https://www.arduino.cc/en/Tutorial/BuiltInExamples/AnalogReadSerial>



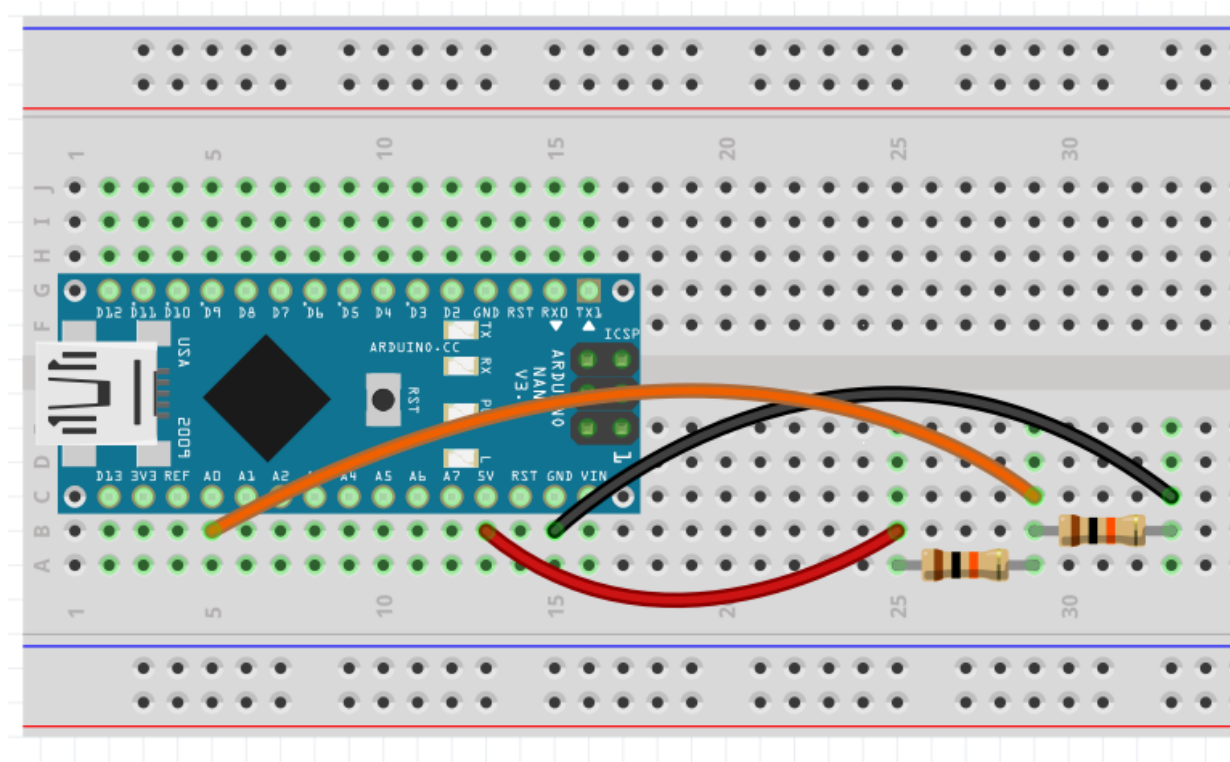
The screenshot displays the Arduino IDE interface. The left pane shows the sketch 'AnalogReadSerial_01' with the following code:

```
13 // the setup routine runs once when you press reset:
14 void setup() {
15   // initialize serial communication at 9600 bits per second:
16   Serial.begin(9600);
17 }
18
19 // the loop routine runs over and over again forever:
20 void loop() {
21   // read the input on analog pin 0:
22   int sensorValue = analogRead(A0);
23   float voltage = (sensorValue*5.0)/1023.0;
24   // print out the value you read:
25   Serial.print(voltage);
26   Serial.println(" V");
27   delay(1);      // delay in between reads for stability
28 }
```

The right pane shows the serial monitor output for COM9, displaying a continuous stream of '5.00 V' values. The status bar at the bottom indicates 'Arduino Nano auf COM9' and 'Autoscroll' is checked.

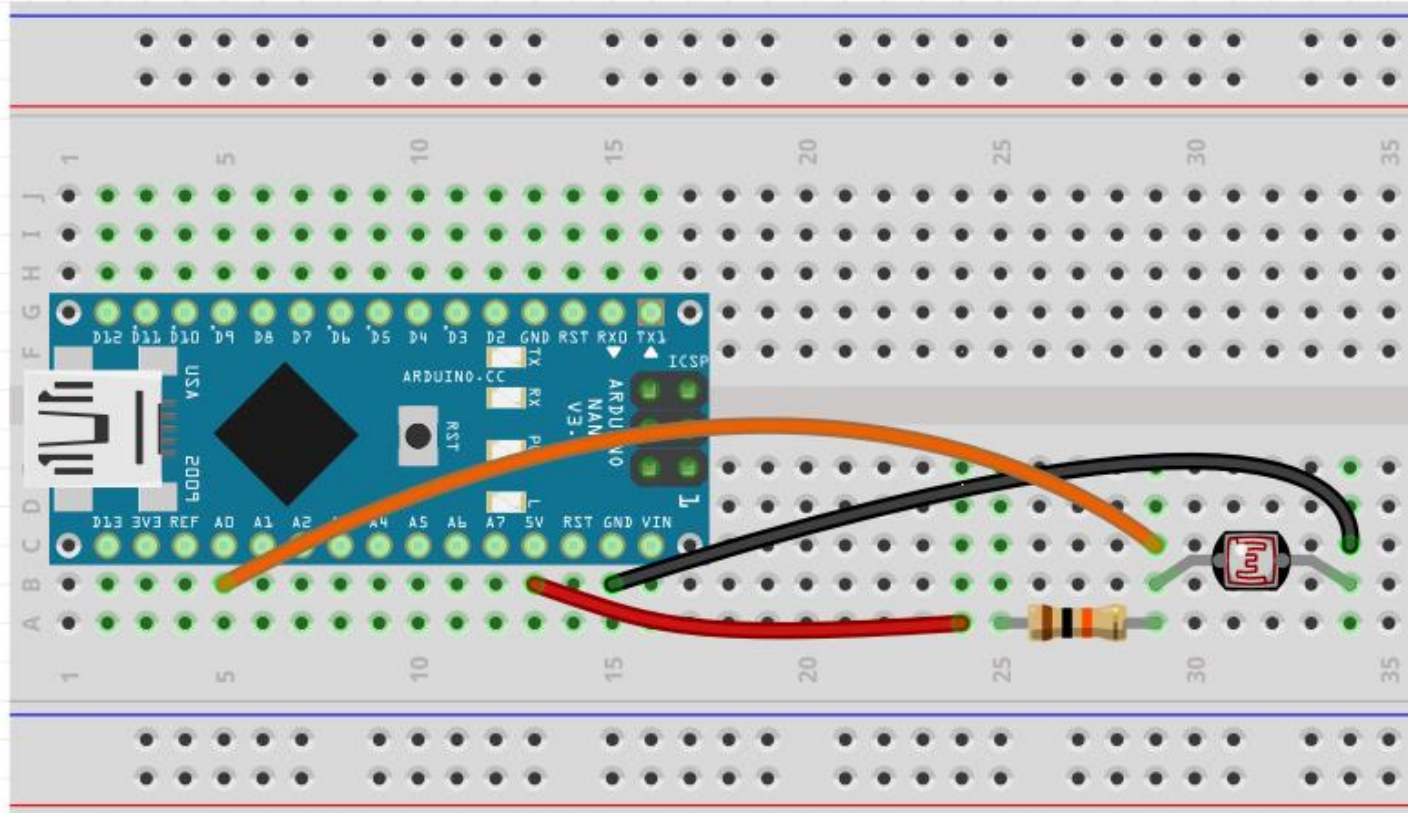
AnalogReadSerial

<https://www.arduino.cc/en/Tutorial/BuiltInExamples/AnalogReadSerial>



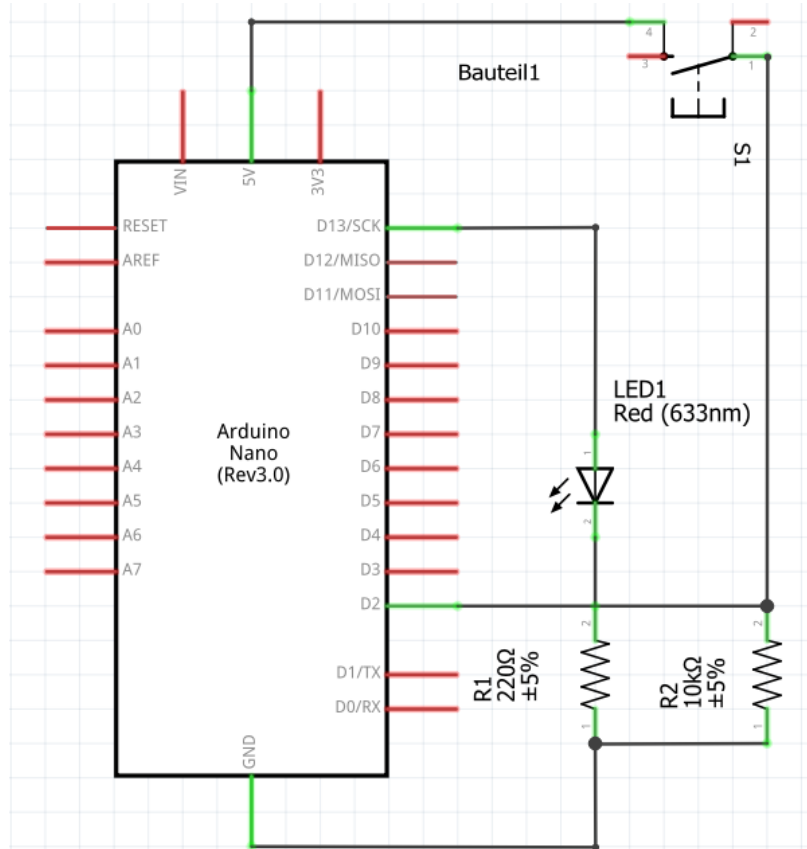
AnalogReadSerial

<https://www.arduino.cc/en/Tutorial/BuiltInExamples/AnalogReadSerial>



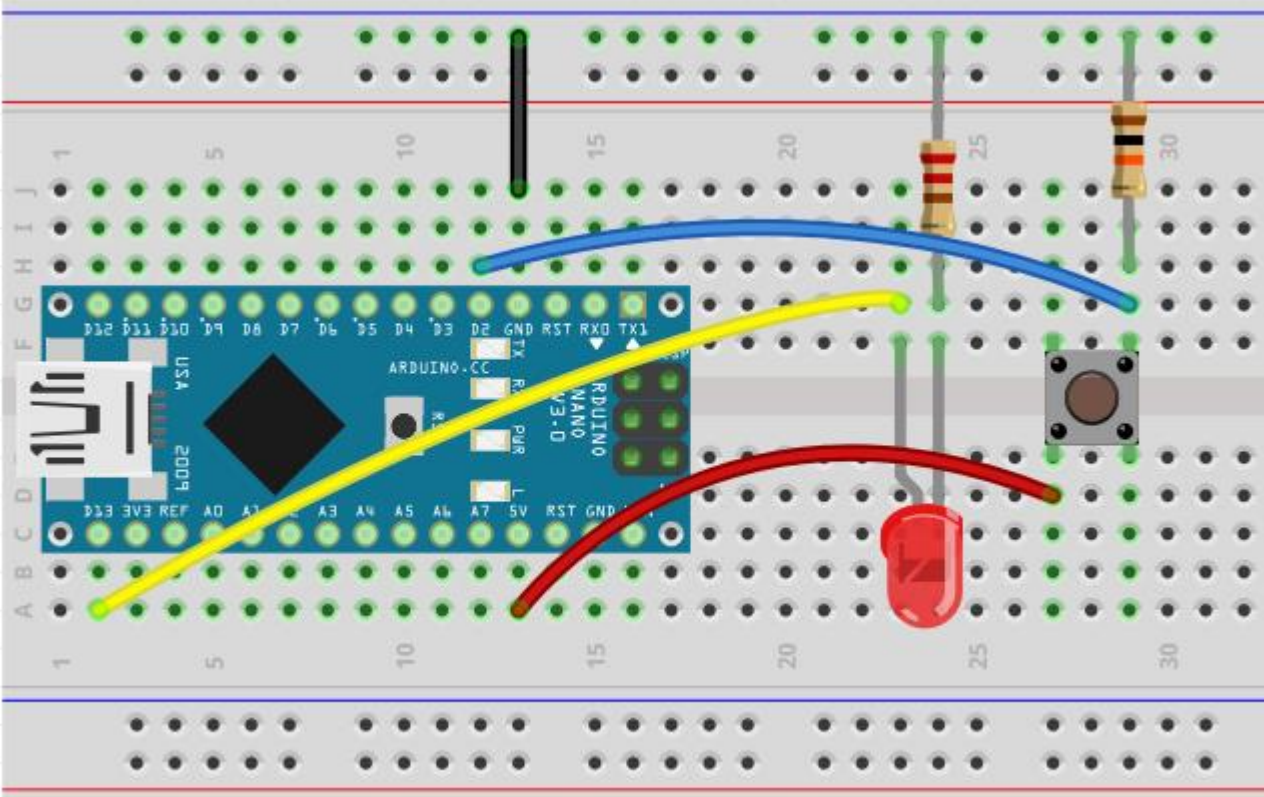
Digital Button

<https://www.arduino.cc/en/Tutorial/BuiltInExamples/Button>



Digital Button

<https://www.arduino.cc/en/Tutorial/BuiltInExamples/Button>



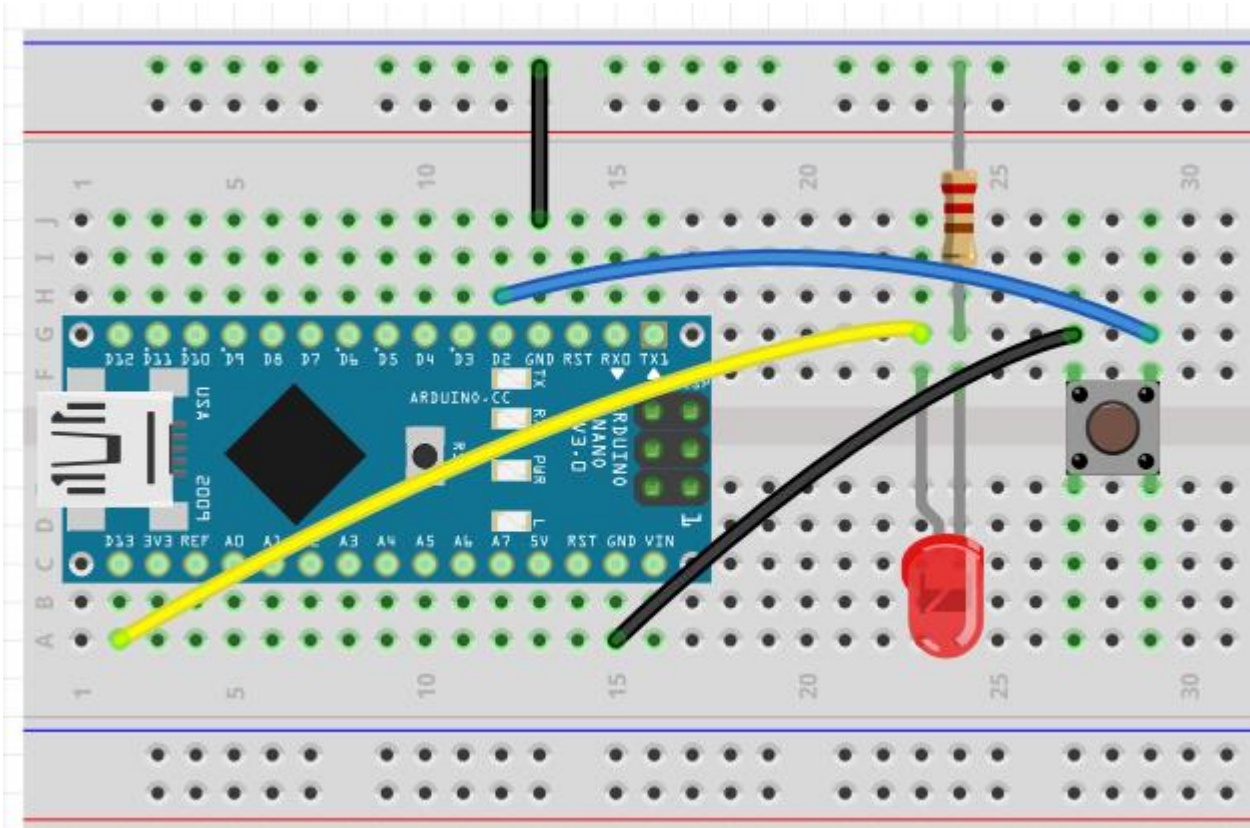
Digital Button

<https://www.arduino.cc/en/Tutorial/BuiltInExamples/Button>

```
25 // constants won't change. They're used here to set pin numbers:
26 const int buttonPin = 2;    // the number of the pushbutton pin
27 const int ledPin = 13;     // the number of the LED pin
28
29 // variables will change:
30 int buttonState = 0;        // variable for reading the pushbutton status
31
32 void setup() {
33   // initialize the LED pin as an output:
34   pinMode(ledPin, OUTPUT);
35   // initialize the pushbutton pin as an input:
36   pinMode(buttonPin, INPUT);
37 }
38
39 void loop() {
40   // read the state of the pushbutton value:
41   buttonState = digitalRead(buttonPin);
42
43   // check if the pushbutton is pressed. If it is, the buttonState is HIGH:
44   if (buttonState == HIGH) {
45     // turn LED on:
46     digitalWrite(ledPin, HIGH);
47   } else {
48     // turn LED off:
49     digitalWrite(ledPin, LOW);
50   }
51 }
```

Digital Button

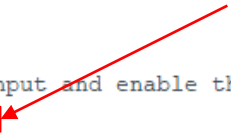
<https://www.arduino.cc/en/Tutorial/BuiltInExamples/InputPullupSerial>



Digital Button

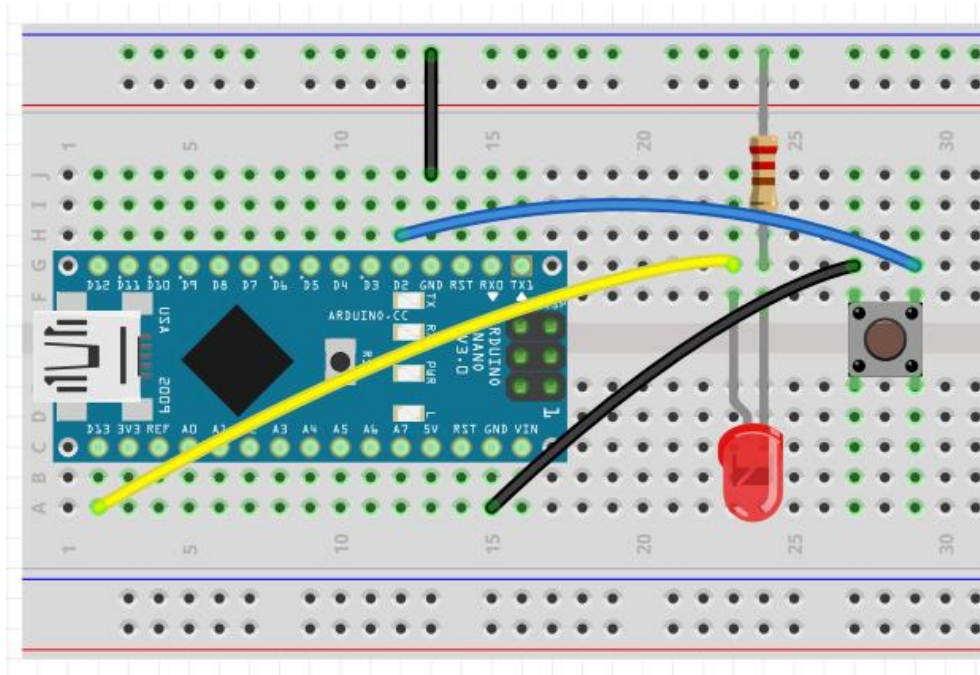
<https://www.arduino.cc/en/Tutorial/BuiltInExamples/InputPullupSerial>

```
23 void setup() {
24   //start serial connection
25   Serial.begin(9600);
26   //configure pin 2 as an input and enable the internal pull-up resistor
27   pinMode(2, INPUT_PULLUP);
28   pinMode(13, OUTPUT);
29
30 }
31
32 void loop() {
33   //read the pushbutton value into a variable
34   int sensorVal = digitalRead(2);
35   //print out the value of the pushbutton
36   Serial.println(sensorVal);
37
38   // Keep in mind the pull-up means the pushbutton's logic is inverted. It goes
39   // HIGH when it's open, and LOW when it's pressed. Turn on pin 13 when the
40   // button's pressed, and off when it's not:
41   if (sensorVal == HIGH) {
42     digitalWrite(13, LOW);
43   } else {
44     digitalWrite(13, HIGH);
45   }
46 }
```



Testat

Ein Arduino sketch
mit einer Funktion “ledBlinken”,
der fünf mal das LED blinkt,
wenn man den Pushbutton drückt.



Vielen Dank fürs Mitmachen!

Ferdinand Meier
FME@hsrw.eu

Bis nächste/übernächste Woche!

