



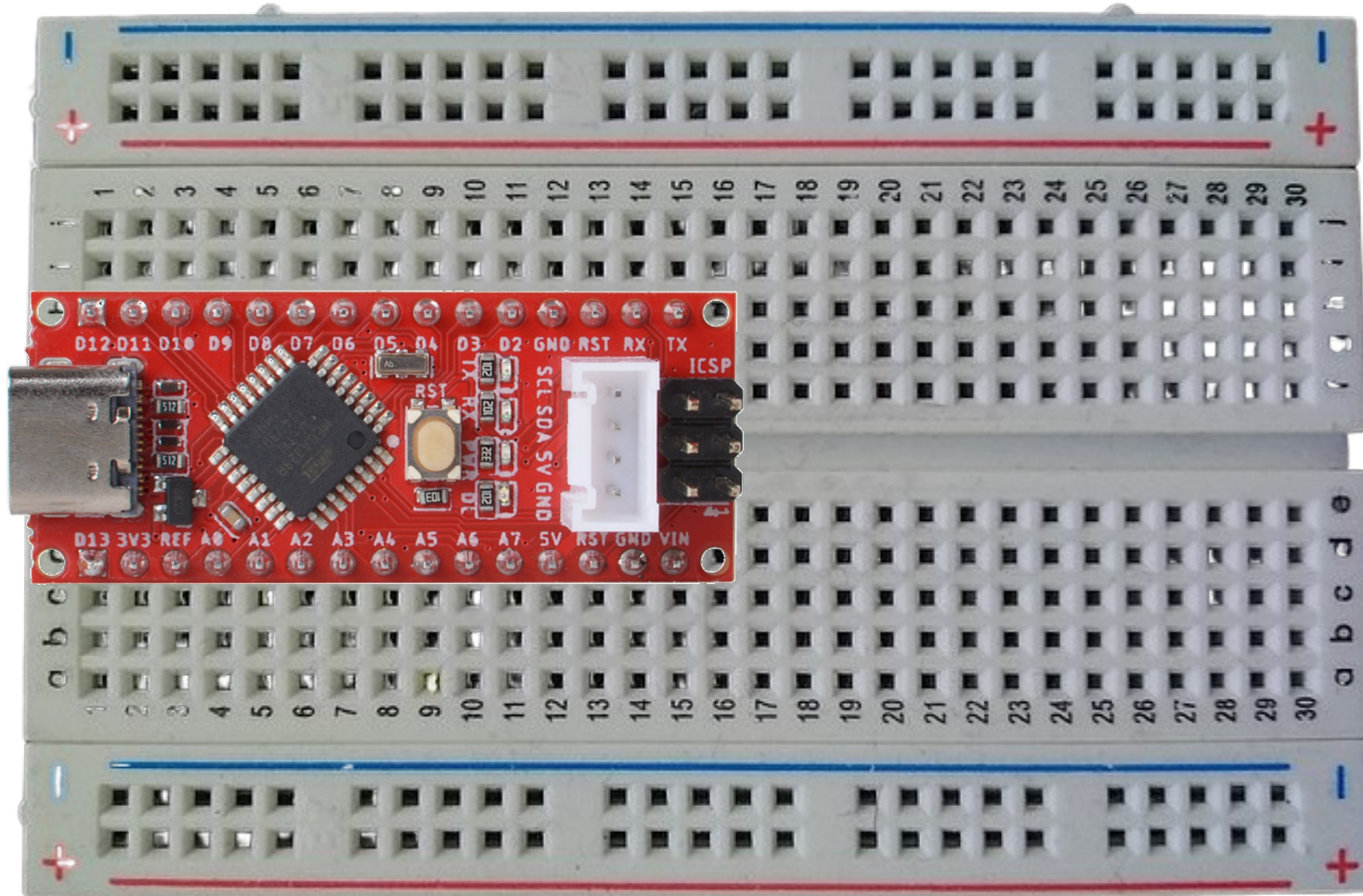
Arduino Basics

5H + 5V

Opdrachten

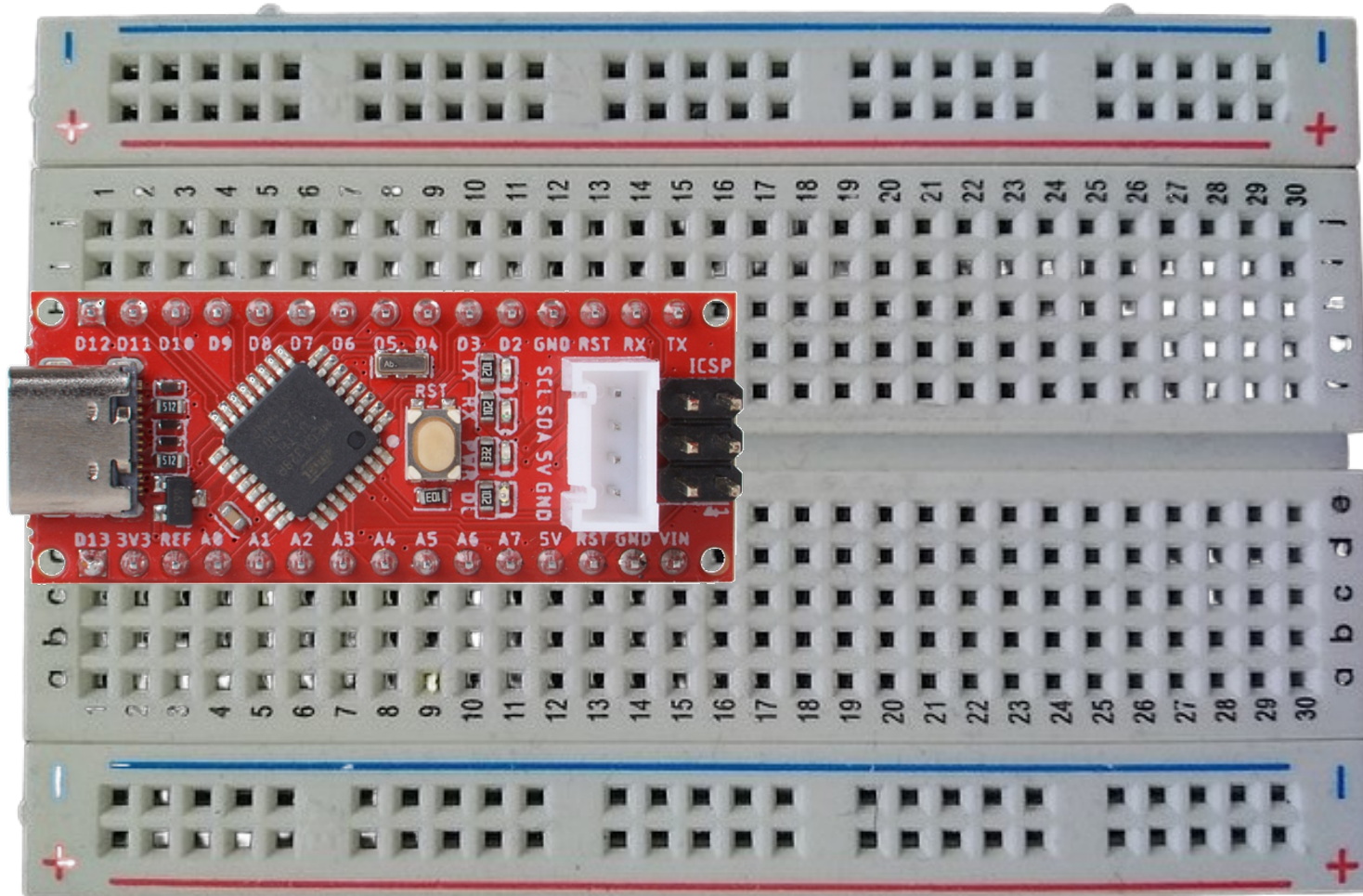
- <https://arduino-lessen.nl>
- Les 1 tot en met 5

Arduino-lessen 1+2: Arduino op breadboard



13-06-2023

Arduino-lessen 1+2: Knipperend LED circuit



13-06-2023

Arduino-lessen 1+2: Knipperend LED code

```
// the setup function runs once when you press reset or power the board
```

```
void setup() {
```

```
  // initialize digital pin LED_BUILTIN as an output.
```

```
  pinMode(LED_BUILTIN, OUTPUT);
```

```
}
```

```
// the loop function runs over and over again forever
```

```
void loop() {
```

```
  digitalWrite(LED_BUILTIN, HIGH); // turn the LED on (HIGH is the voltage level)
```

```
  delay(1000); // wait for a second
```

```
  digitalWrite(LED_BUILTIN, LOW); // turn the LED off by making the voltage LOW
```

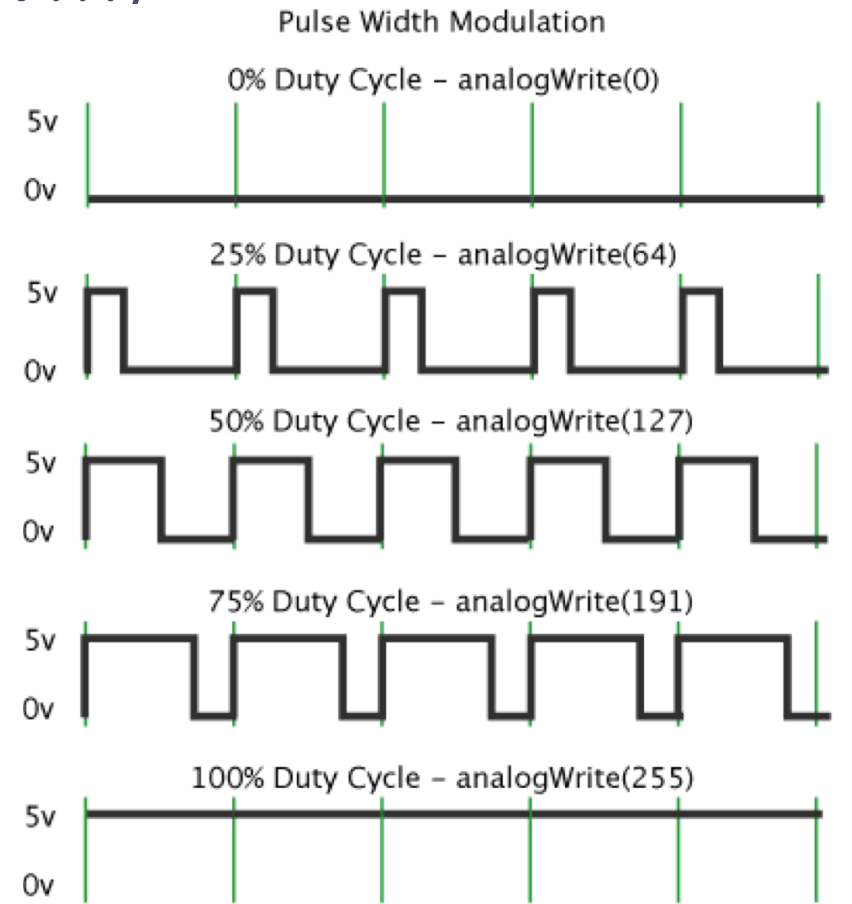
```
  delay(1000); // wait for a second
```

```
}
```

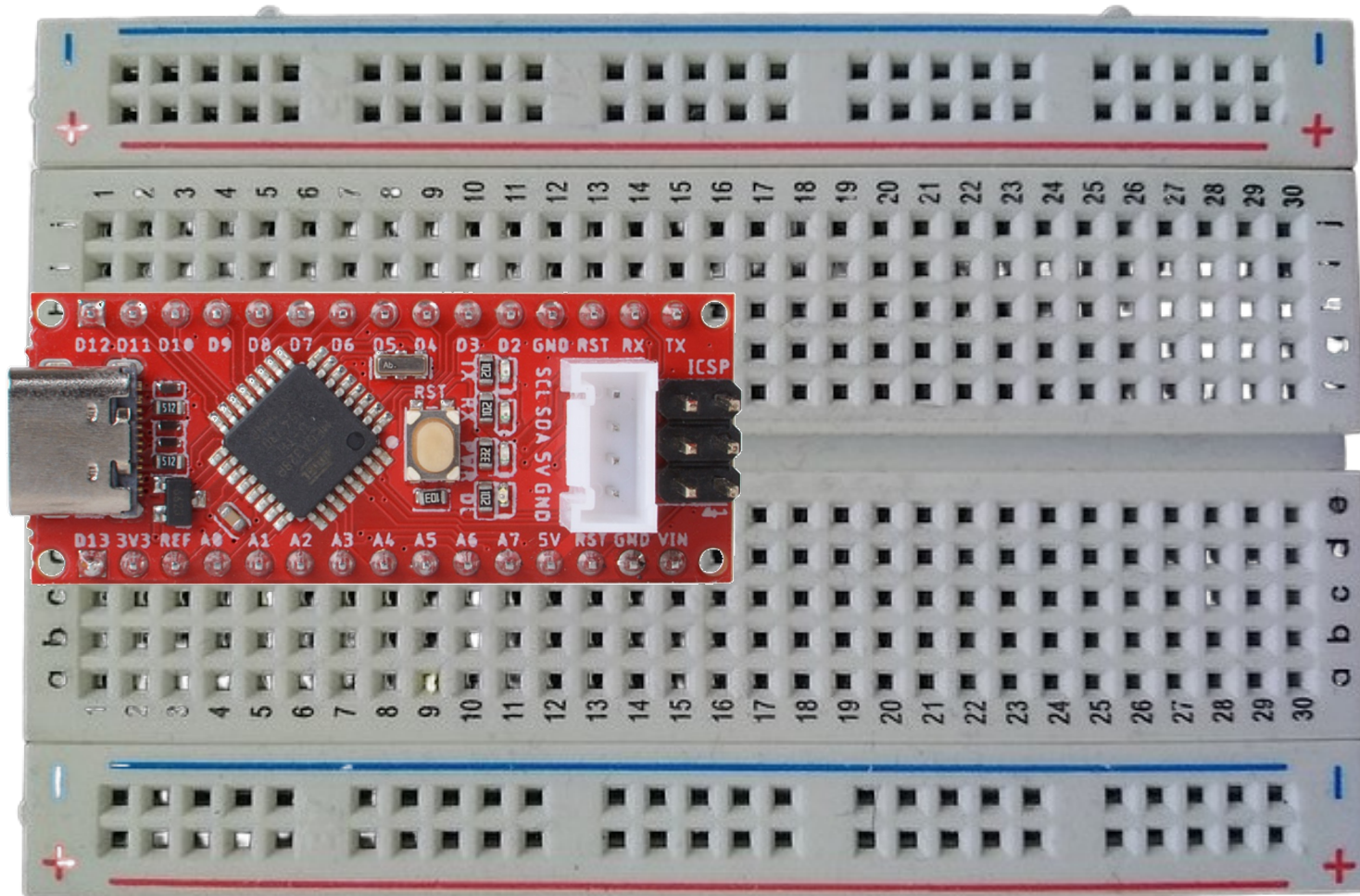
Arduino-lessen 3: gedimd led theorie

Pulse Width Modulation (PWM)

- PWM doet net alsof je een digitale poort ook een waarde TUSSEN 0 en 1 kunt geven.
- Heel snel aan en uit
- Het percentage van de tijd dat PWM aan staat, noemen we de duty cycle



Arduino-lessen 3: gedimd LED circuit



Op de meeste Arduino's zijn de PWM pins aangegeven met een "~" teken, zoals ~3, ~5, ~6, ~9, ~10 en ~11.

Bij de Arduino op de afbeelding is dit helaas niet zo. De pinnen met PWM zijn wel dezelfde: 3, 5, 6, 9, 10 en 11.

Arduino-les 3: gedimd LED code

```
int ledPin = 9;           // the PWM pin the LED is attached to
int brightness = 0;      // how bright the LED is
int fadeAmount = 5;      // how many points to fade the LED by

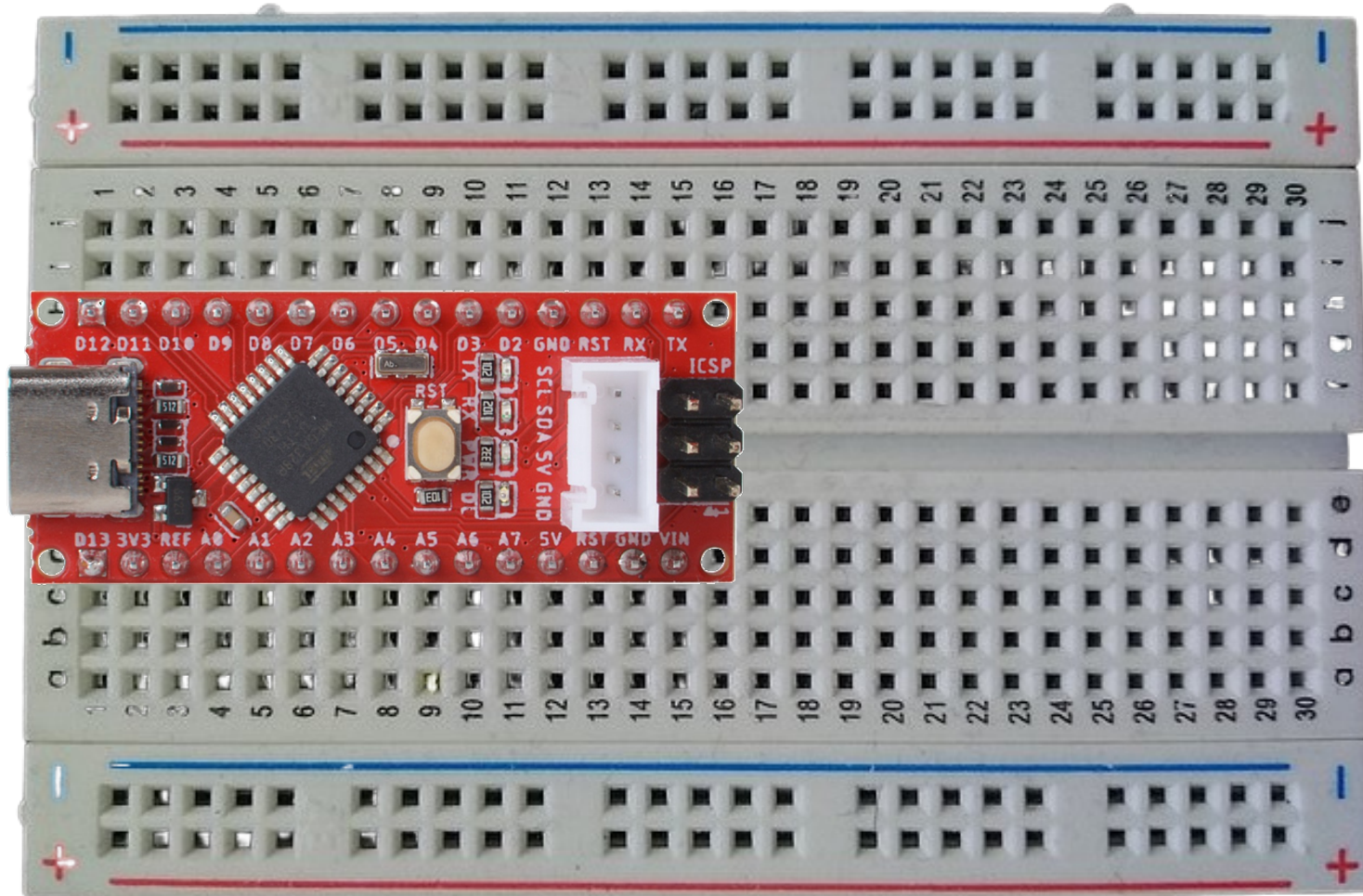
// the setup routine runs once when you press reset:
void setup() {
  // declare pin 9 to be an output:
  pinMode(ledPin, OUTPUT);
}

// the loop routine runs over and over again forever:
void loop() {
  // set the brightness of pin 9:
  analogWrite(ledPin, brightness);

  // change the brightness for next time through the loop:
  brightness = brightness + fadeAmount;

  // reverse the direction of the fading at the ends of the fade:
  if (brightness <= 0 || brightness >= 255) {
    fadeAmount = -fadeAmount;
  }
  // wait for 30 milliseconds to see the dimming effect
  delay(30);
}
```


Arduino-lessen 4: potmeter



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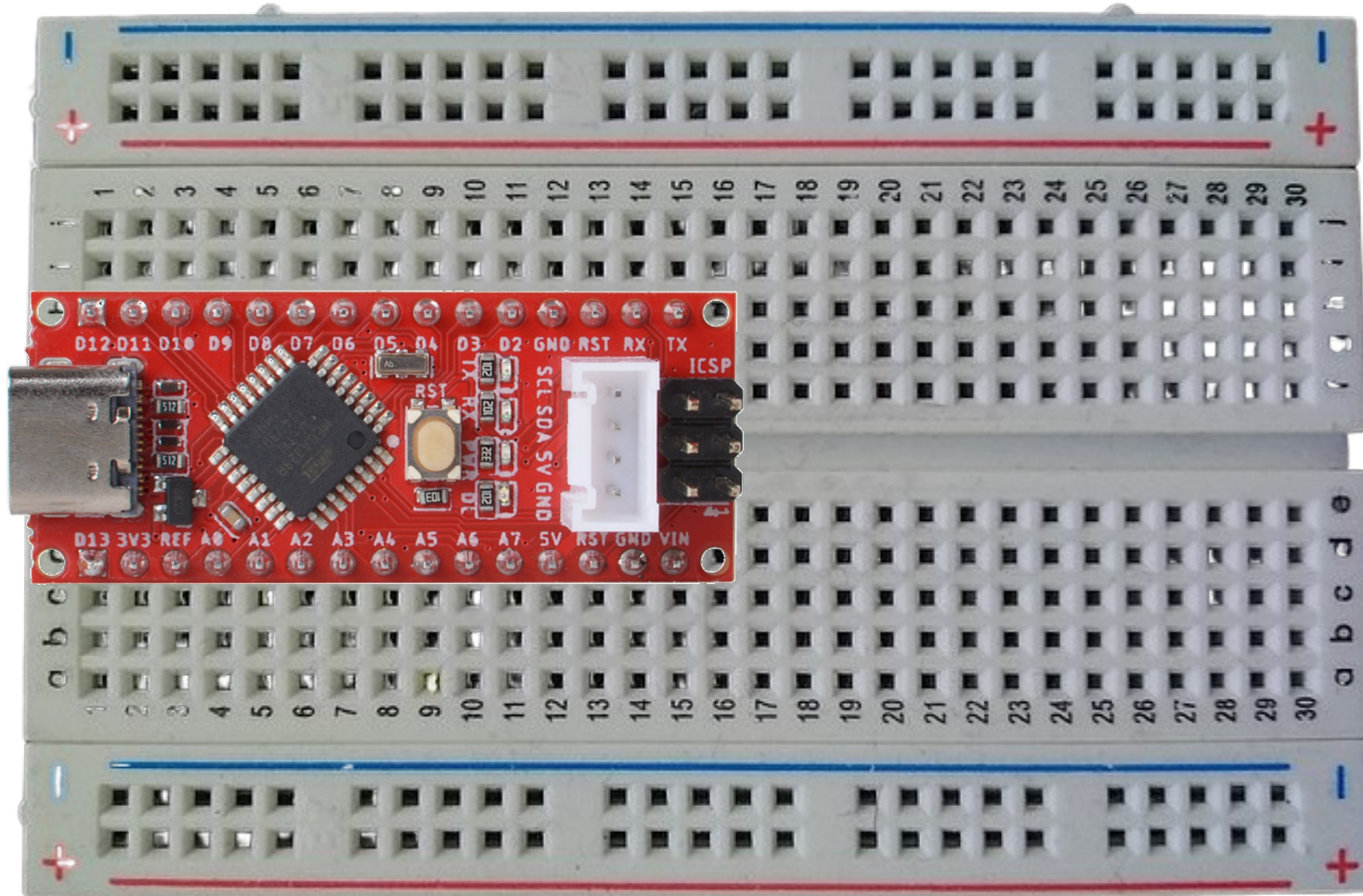
Arduino-les 4: potmeter

```
int sensorPin = A0;    // select the input pin for the potentiometer
int ledPin = 13;      // select the pin for the LED
int sensorValue = 0;  // variable to store the value coming from the sensor

void setup() {
  // declare the ledPin as an OUTPUT:
  pinMode(ledPin, OUTPUT);
  pinMode(sensorPin, INPUT);
}

void loop() {
  // read the value from the sensor:
  sensorValue = analogRead(sensorPin);
  // turn the ledPin on
  digitalWrite(ledPin, HIGH);
  // stop the program for <sensorValue> milliseconds:
  delay(sensorValue);
  // turn the ledPin off:
  digitalWrite(ledPin, LOW);
  // stop the program for for <sensorValue> milliseconds:
  delay(sensorValue);
}
```

Arduino-lessen 5: knop



13-06-2023

Arduino-les 5: knop

```
// constants won't change. They're used here to set pin numbers:
const int buttonPin = 2;    // the number of the pushbutton pin
const int ledPin = 13;     // the number of the LED pin

// variables will change:
int buttonState = 0;       // variable for reading the pushbutton status

void setup() {
  // initialize the LED pin as an output:
  pinMode(ledPin, OUTPUT);
  // initialize the pushbutton pin as an input:
  pinMode(buttonPin, INPUT);
}

void loop() {
  // read the state of the pushbutton value:
  buttonState = digitalRead(buttonPin);

  // check if the pushbutton is pressed. If it is, the buttonState is HIGH:
  if (buttonState == HIGH) {
    // turn LED on:
    digitalWrite(ledPin, HIGH);
  } else {
    // turn LED off:
    digitalWrite(ledPin, LOW);
  }
}
```

Samenvatting

	Input (sensoren)	Output (actuatoren)
digitaal	Knop → LOW of HIGH	Led → LOW of HIGH
analoog	Potmeter → 0-1023	gedimde led, motor, servo → 0-255

Pin nummers	input	output
digitaal	xx (Axx kan het ook)	xx (~xx kan het ook)
analoog	Axx	~xx (in je code laat je de ~ weg)

pinMode	input	output
digitaal	<code>pinMode(pin, INPUT);</code>	<code>pinMode(pin, OUTPUT);</code>
analoog	<code>pinMode(pin, INPUT);</code>	<code>pinMode(pin, OUTPUT);</code>

read / write	input	output
digitaal	<code>waarde = digitalRead(pin);</code>	<code>digitalWrite(pin, waarde);</code>
analoog	<code>waarde = analogRead(pin);</code>	<code>analogWrite(pin, waarde)</code>

Fouten zoeken: Serial monitor

- Kies in de Arduino IDE in het menu: [hulpmiddelen -> serial monitor](#)

```
// the setup routine runs once when you press reset:
```

```
void setup() {  
  // initialize serial communication at 9600 bits per second:  
  Serial.begin(9600);  
}
```

```
// the loop routine runs over and over again forever:
```

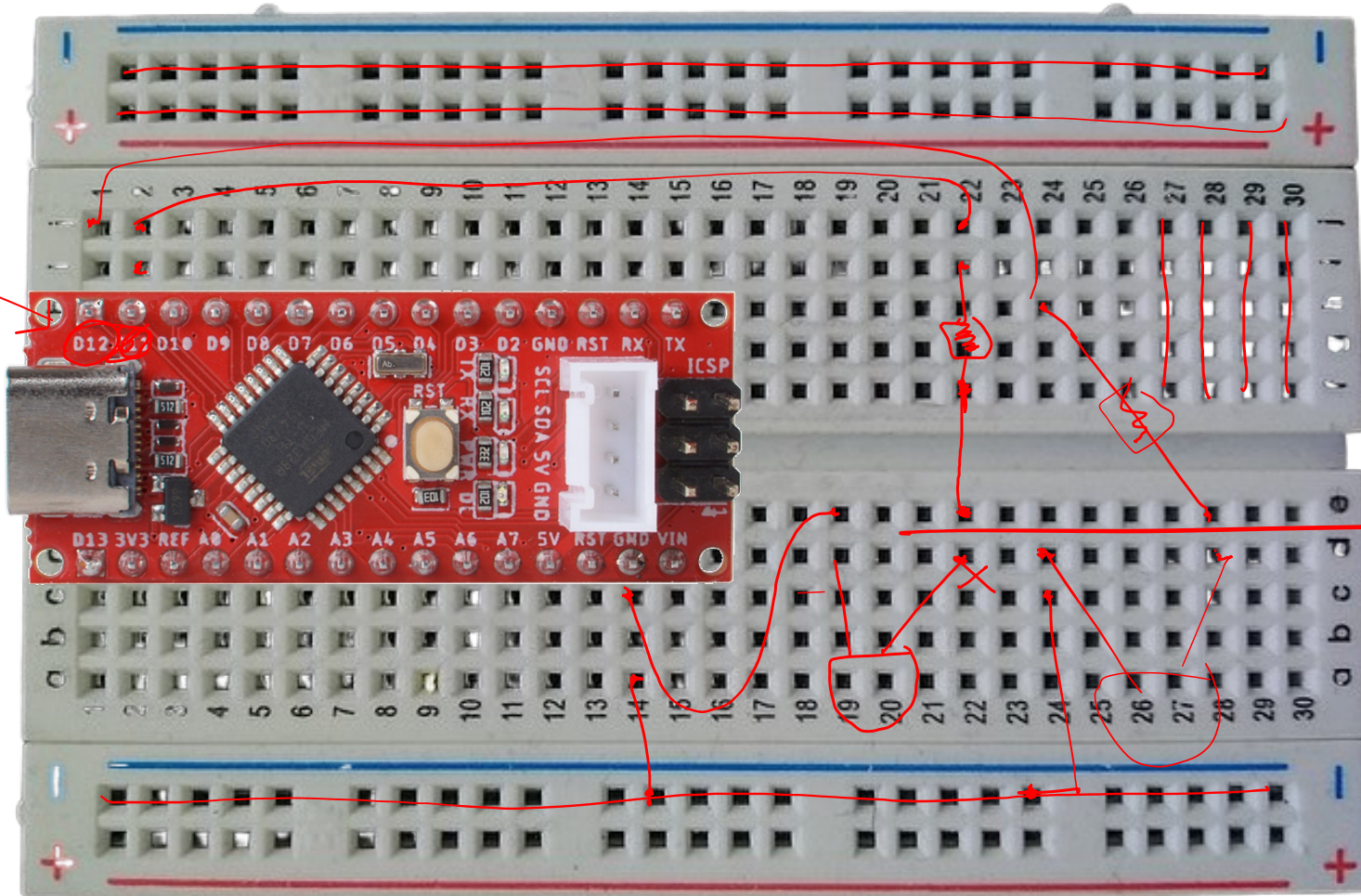
```
void loop() {  
  // read the input on analog pin 0:  
  int sensorValue = analogRead(A0);  
  // print out the value you read:  
  Serial.println(sensorValue);  
  delay(1);      // delay in between reads for stability  
}
```



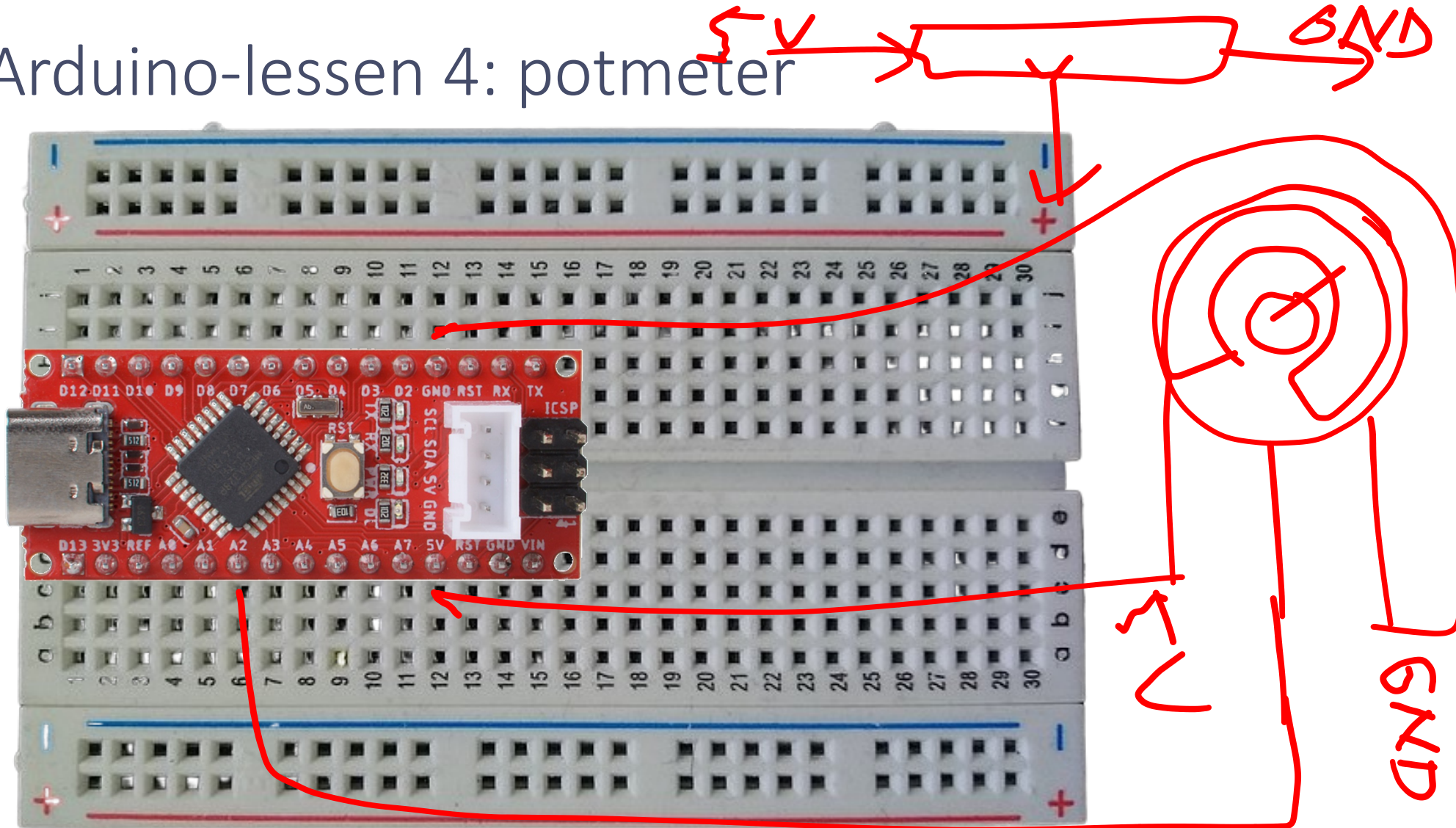
CIRCUIT TEKENINGEN (slides hierna)

Dit zijn de tekeningen die de docent
tijdens de uitleg op het smartboard tekent

Arduino-lessen 1+2: knipperend led

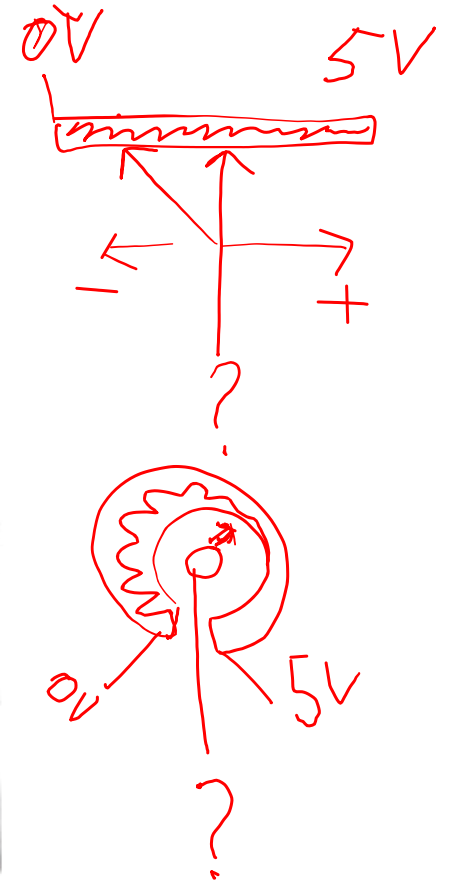
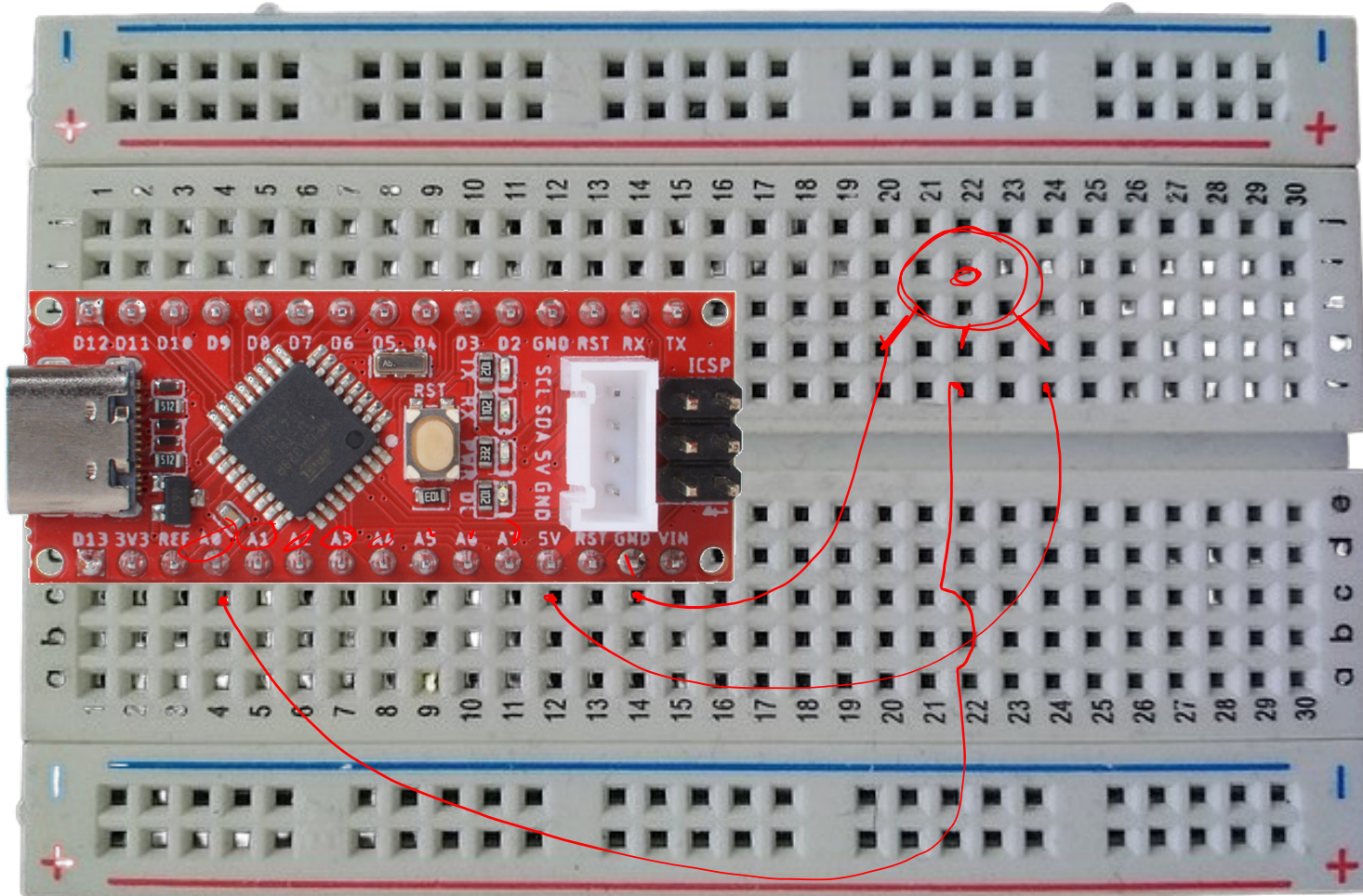


Arduino-lessen 4: potmeter



Arduino-les 4: potmeter

0-1023



Arduino-lessen 5: knop

