

Arduino dag 1

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<http://github.com/richelbilderbeek/ArduinoCourse>

Overzicht

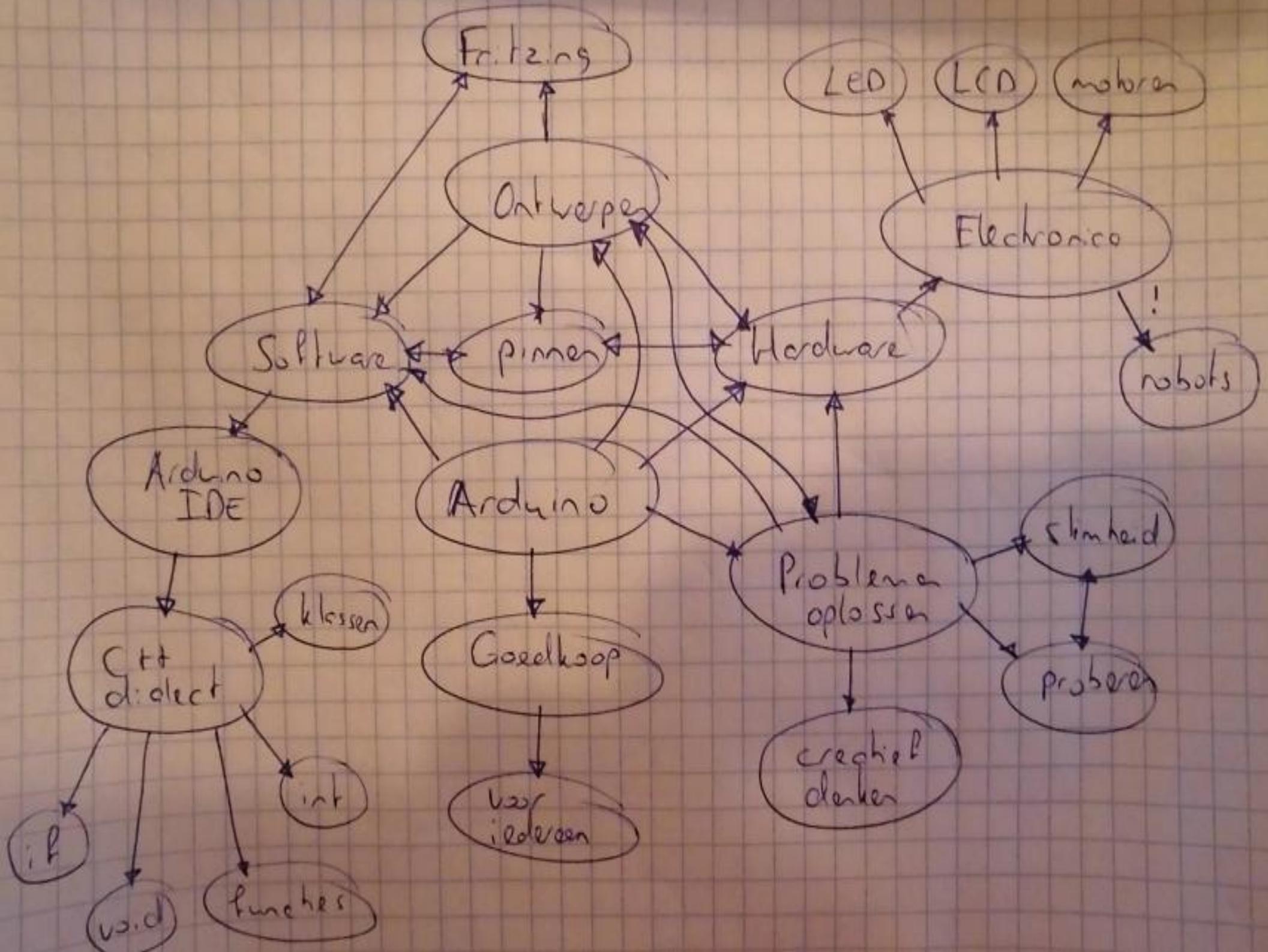
1. Doel
2. Wat is Arduino?
3. Wat kun je met Arduino?
4. Blink: LED aansturen
5. meer LEDs aansturen
6. Toffe ideen?
7. AnalogReadSerial: lichtsensoren lezen
8. Sweep: servomotor
9. Afsluiting

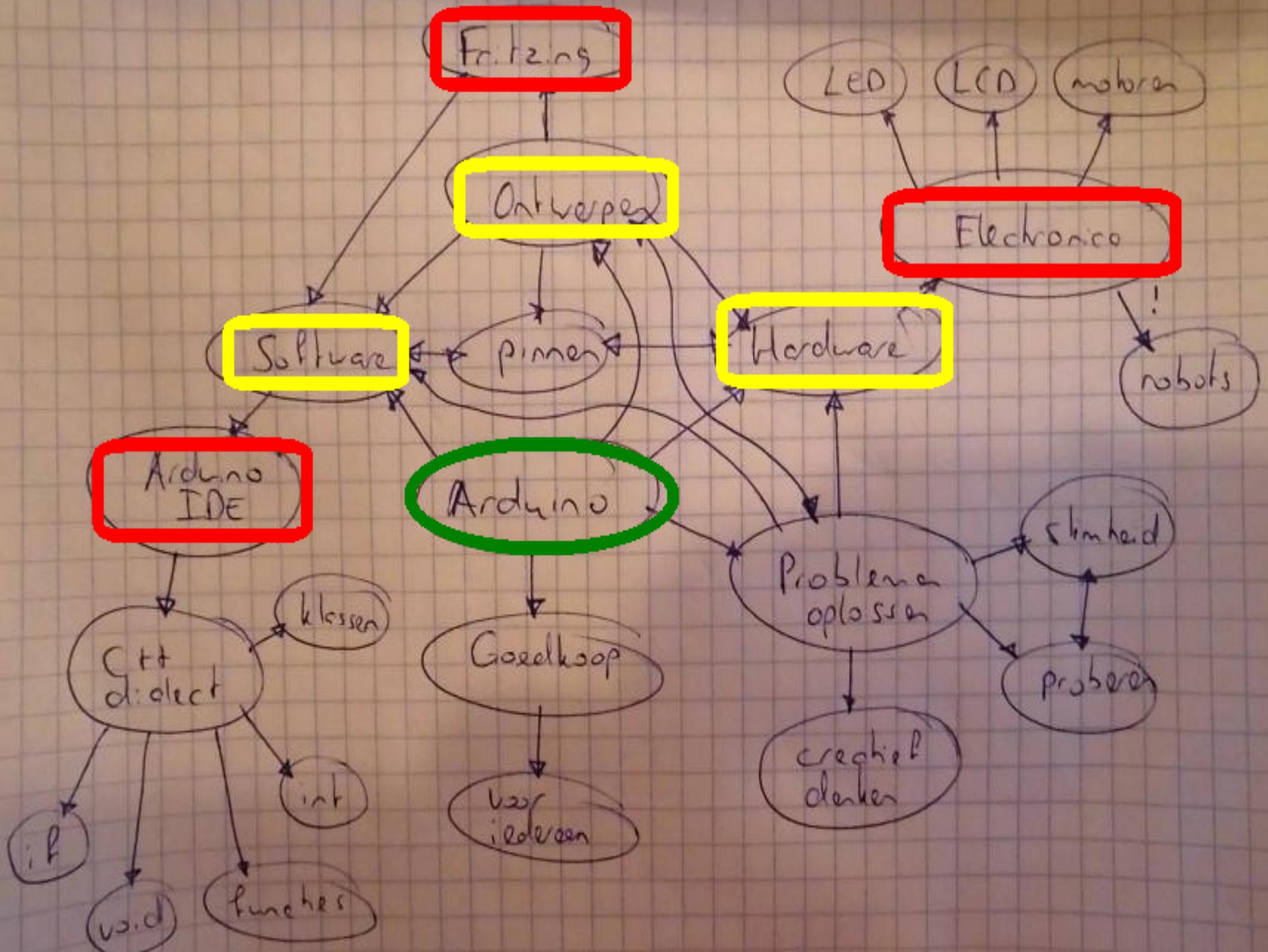
1. Doel

- Arduino goed genoeg leren kennen om er zelf mee verder te kunnen gaan

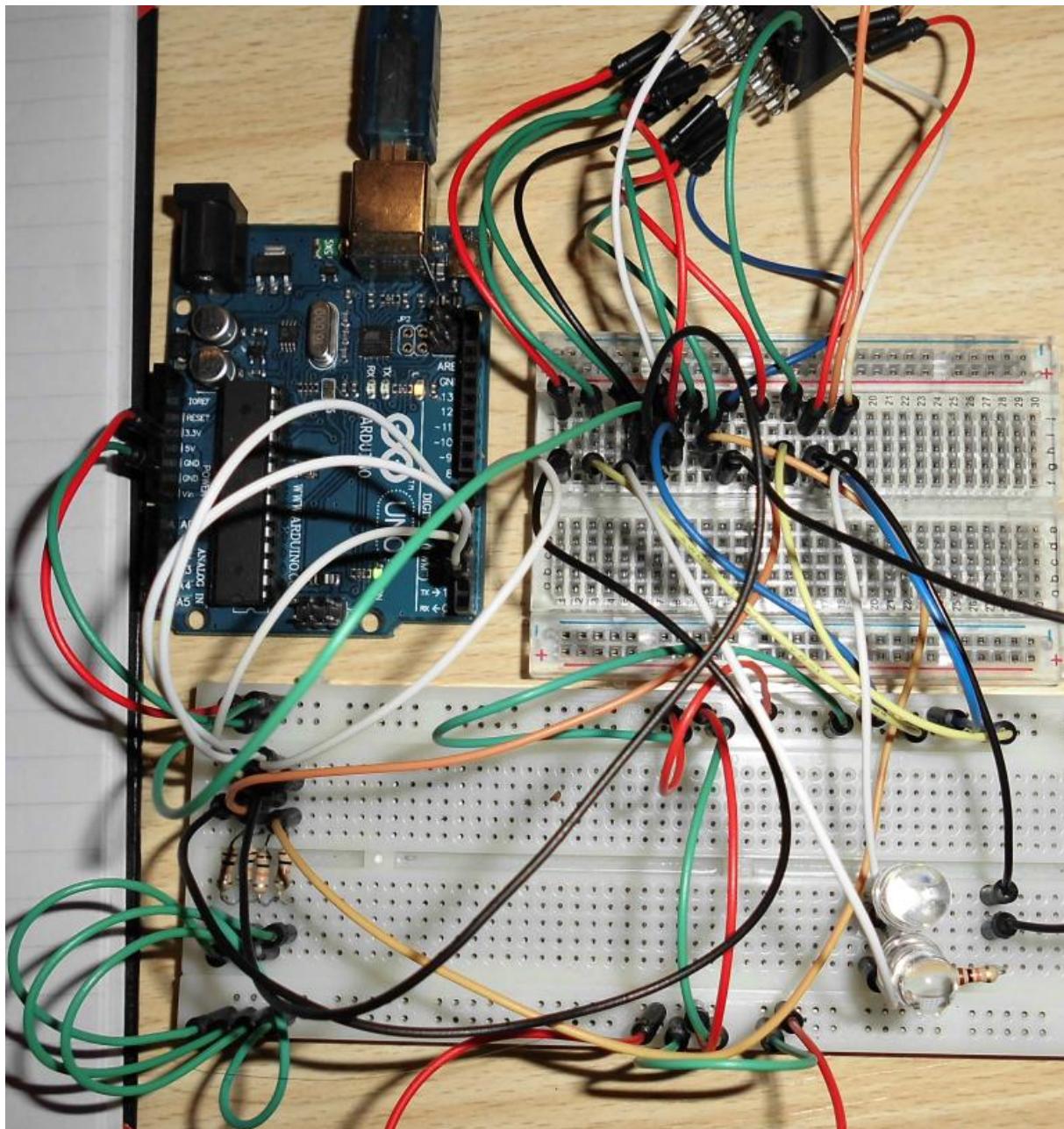
2. Wat is Arduino?

?

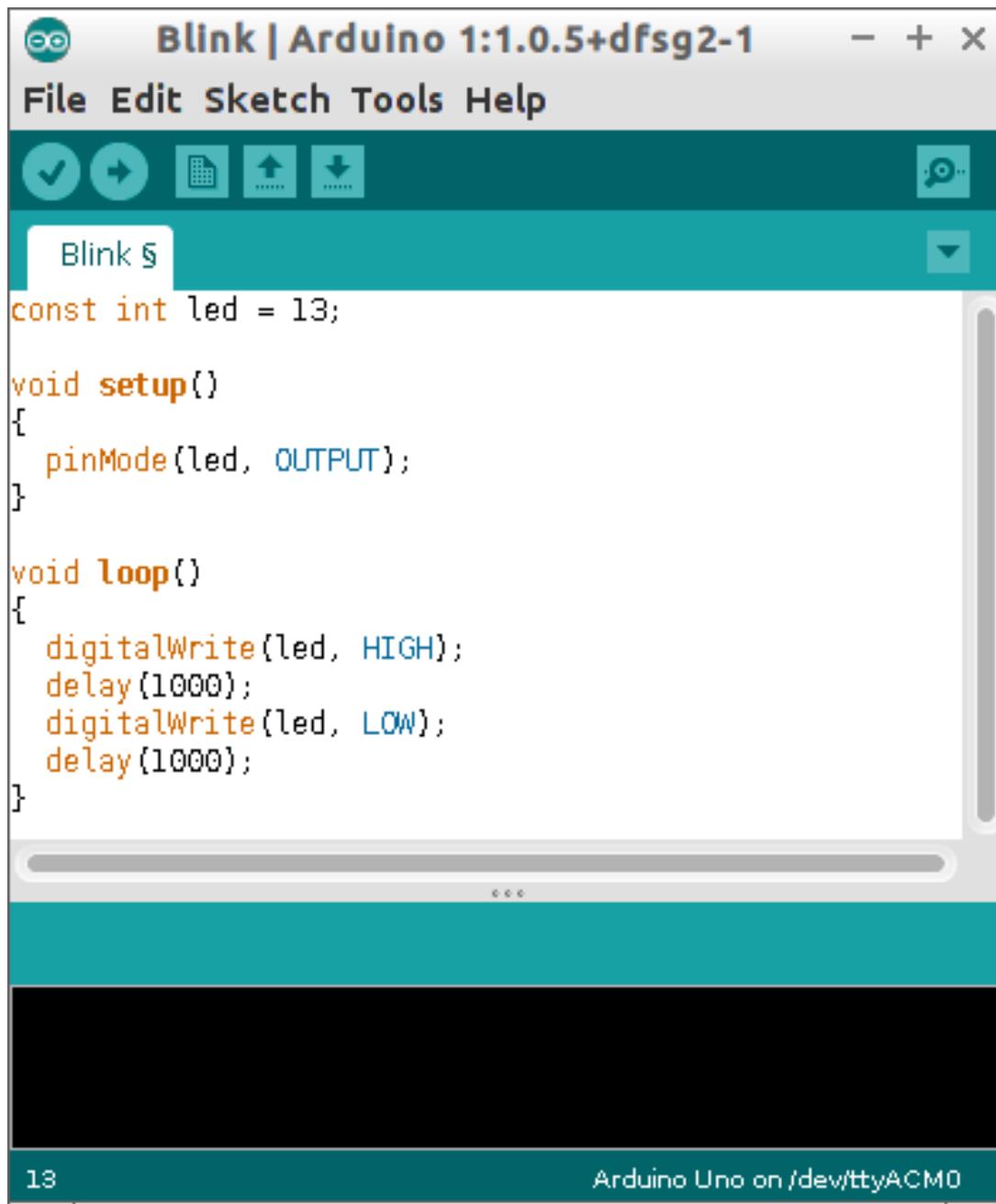




Hardware



Software: Arduino IDE



The image shows a screenshot of the Arduino IDE interface. The title bar reads "Blink | Arduino 1:1.0.5+dfsg2-1". The menu bar includes "File", "Edit", "Sketch", "Tools", and "Help". Below the menu is a toolbar with icons for save, run, upload, and download. The main code editor window displays the "Blink" sketch:

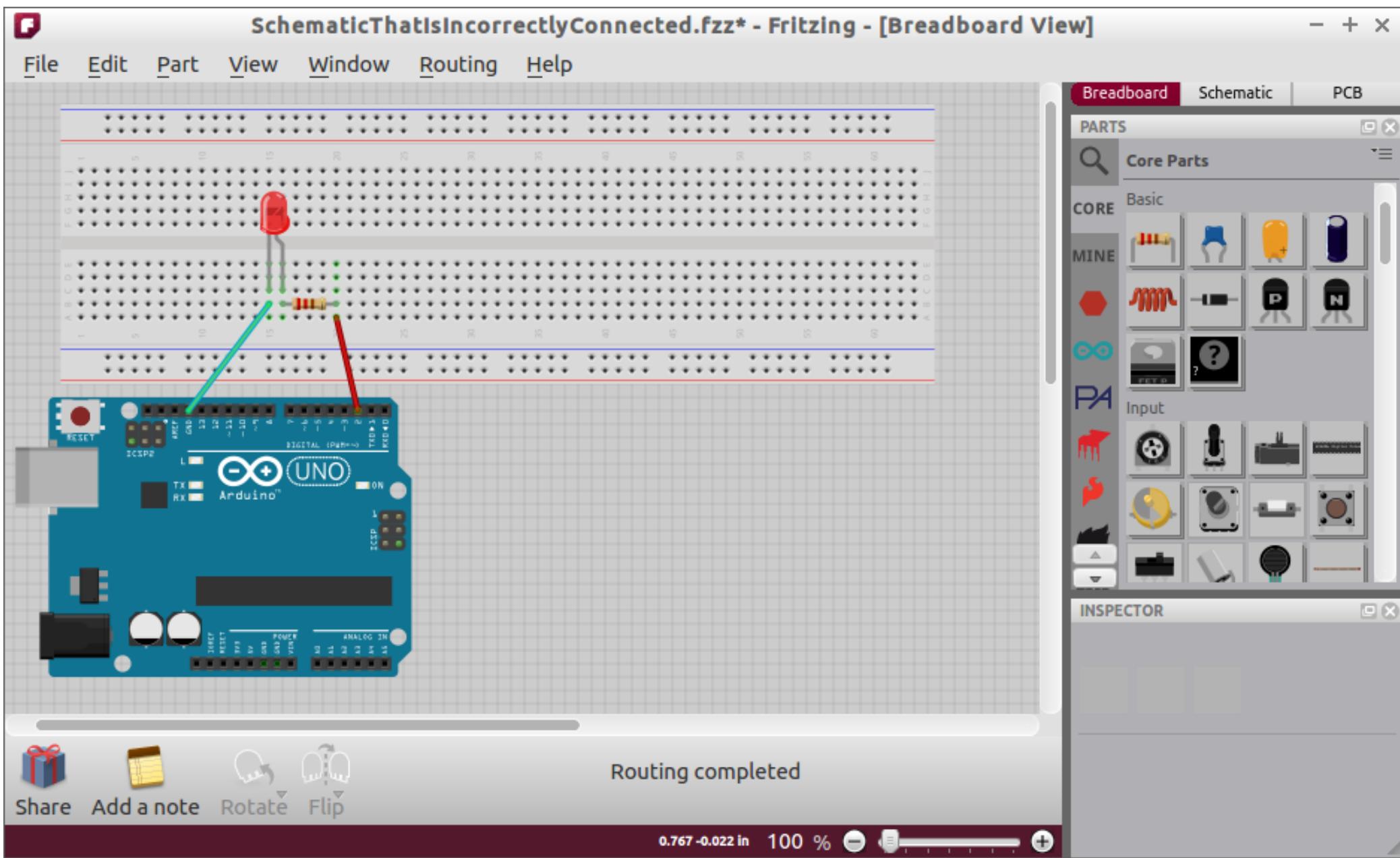
```
const int led = 13;

void setup()
{
  pinMode(led, OUTPUT);
}

void loop()
{
  digitalWrite(led, HIGH);
  delay(1000);
  digitalWrite(led, LOW);
  delay(1000);
}
```

The status bar at the bottom shows "13" on the left and "Arduino Uno on /dev/ttyACM0" on the right.

Ontwerpen: Fritzing



3. Wat kun je met Arduino?

?

3. Wat kun je met Arduino?

- Elke elektronische machine bouwen

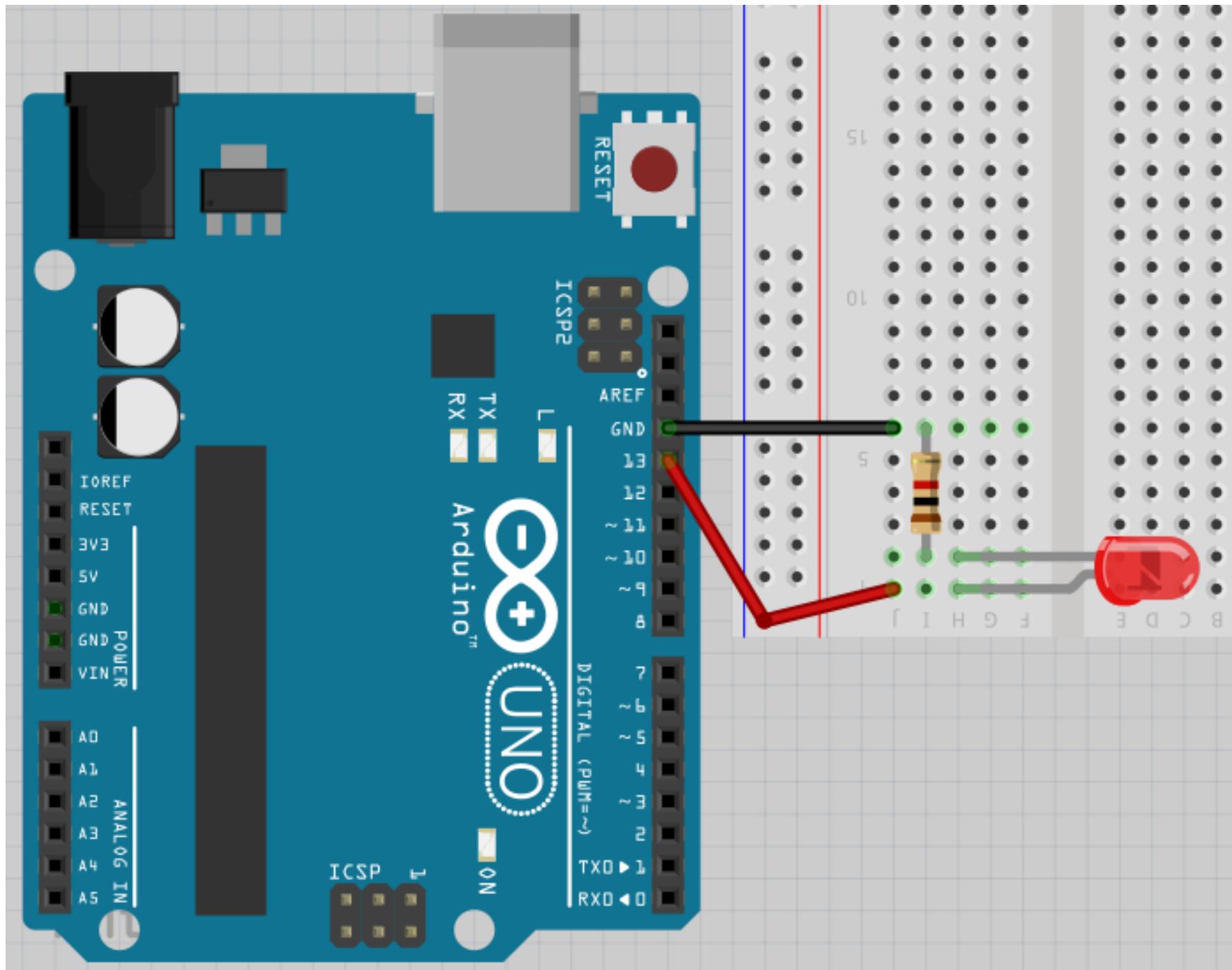
3. Wat kun je met Arduino?

- Elke elektronische machine bouwen
 - Alleen Arduino: 5 volt gelijkspanning, 40 milliampere per pin
 - Met transistoren, relais en externe voeding: elk vermogen
 - Met shields: speciale functies, zoals WiFi, GPS, ethernet, data logger
 - Ook: computers aansturen, bijvoorbeeld Raspberry Pi

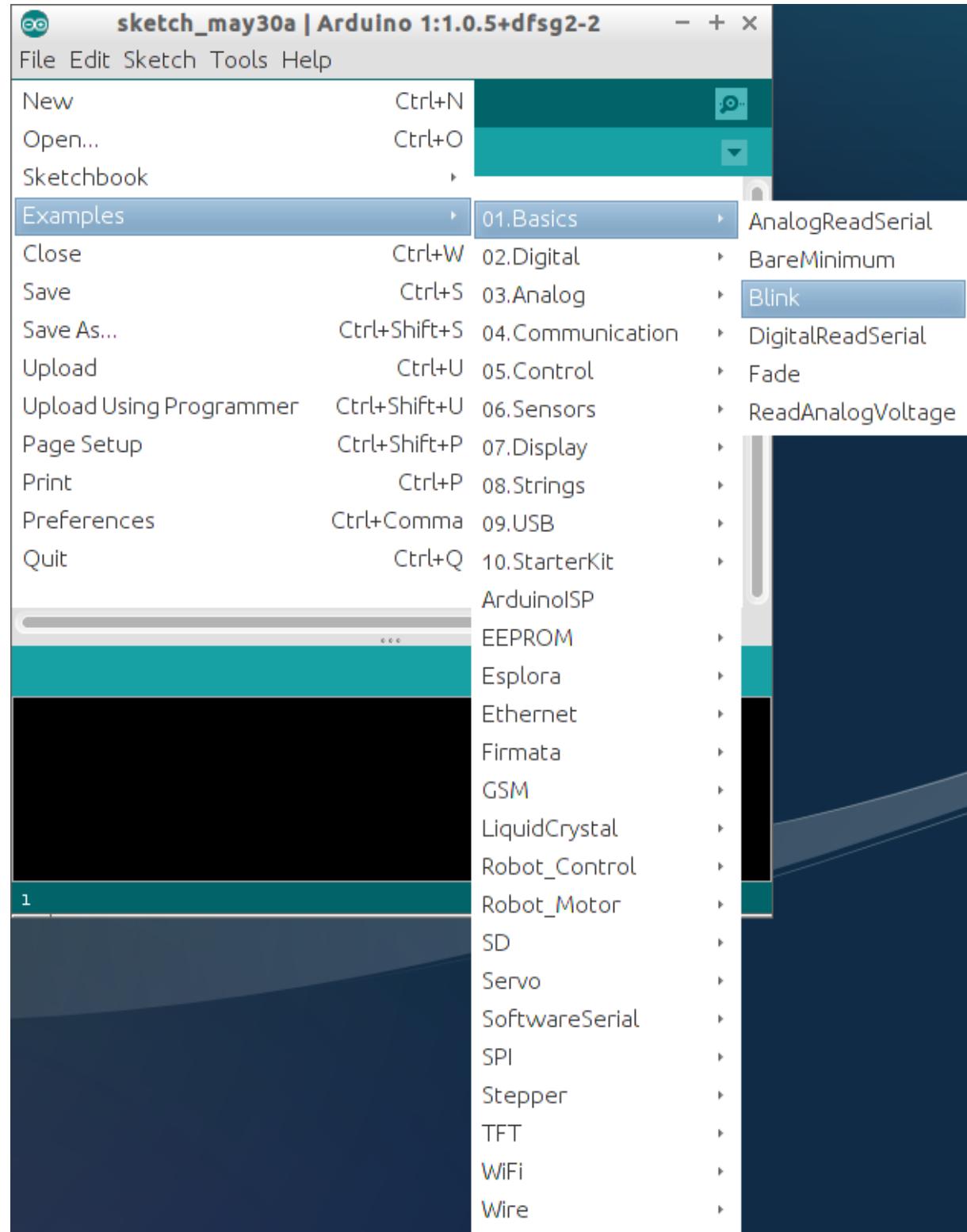
4. Blink: LED aansturen

- Laat een LEDje knipperen
- Simpelste output voorbeeld
- Wordt vaak gebruikt om de Arduino te checken

Stroomschema



Code



Code

The screenshot shows the Arduino IDE interface with the following details:

- Title Bar:** Blink | Arduino 1:1.0.5+dfsg2-1
- Menu Bar:** File Edit Sketch Tools Help
- Toolbar:** Includes icons for Save, Undo, Redo, Cut, Copy, Paste, Select All, Find, and Upload. The Upload icon is highlighted with a cursor.
- Sketch Name:** Blink §
- Code Area:** Displays the standard Blink sketch:

```
// Pin 13 has an LED connected on most Arduino boards.  
// give it a name:  
int led = 13;  
  
// the setup routine runs once when you press reset:  
void setup() {  
    // initialize the digital pin as an output.  
    pinMode(led, OUTPUT);  
}  
  
// the loop routine runs over and over again forever:  
void loop() {  
    digitalWrite(led, HIGH);      // turn the LED on (HIGH is the voltage  
    delay(1000);                // wait for a second  
    digitalWrite(led, LOW);       // turn the LED off by making the volta  
    delay(1000);                // wait for a second  
}
```
- Serial Monitor:** A large black area at the bottom of the window.
- Status Bar:** Shows the text "19" on the left and "Arduino Uno on /dev/ttyACM0" on the right.

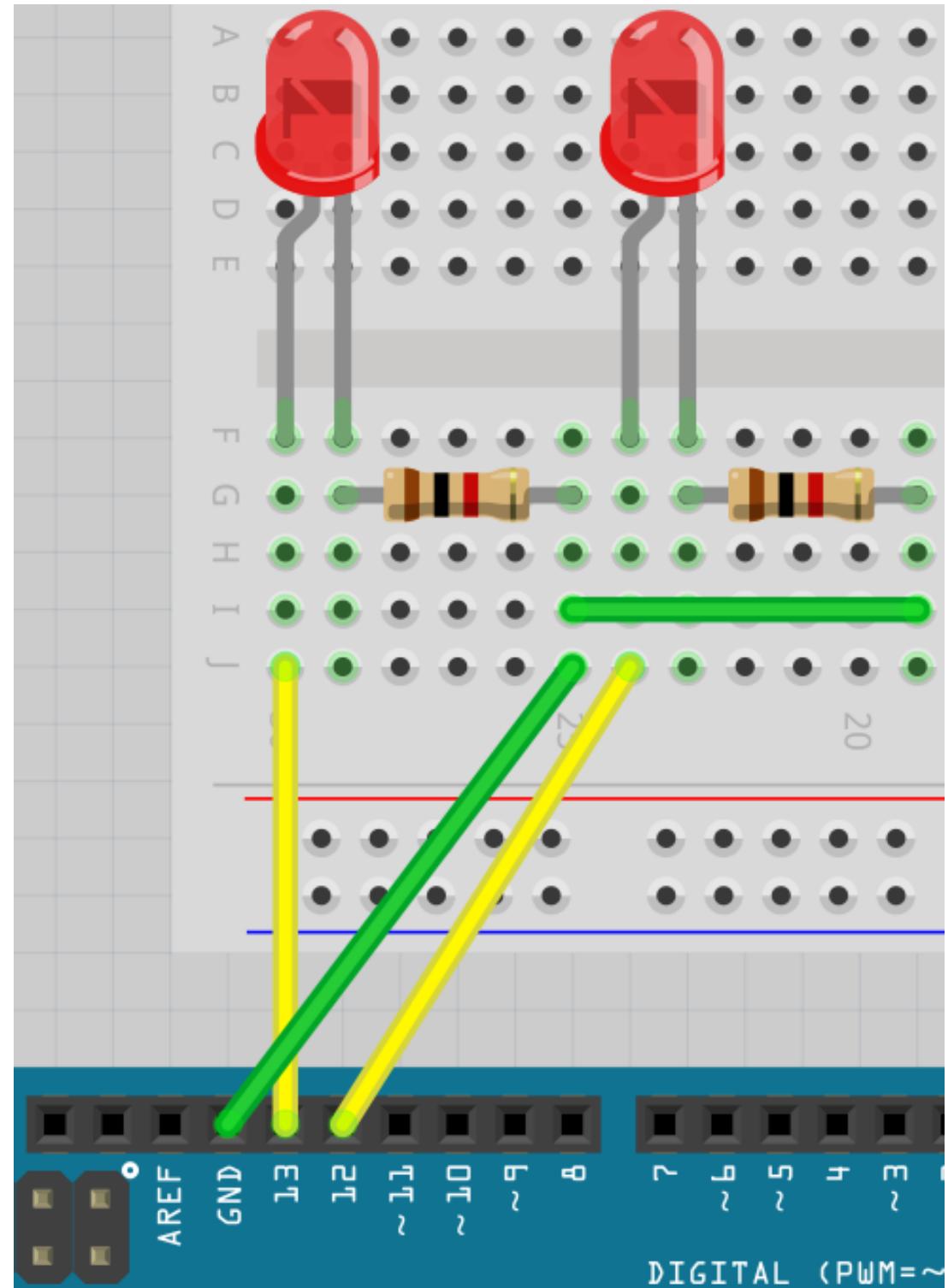
Blink: opdracht

- Sluit de LED aan
 - Lange poot LED verbinden met pin 13
 - Korte poot LED verbinden met weerstand (1000 Ohm, bruin-zwart-rood-goud)
- Verbind de Arduino via USB met de laptop
- Upload het voorbeeld 'Blink'

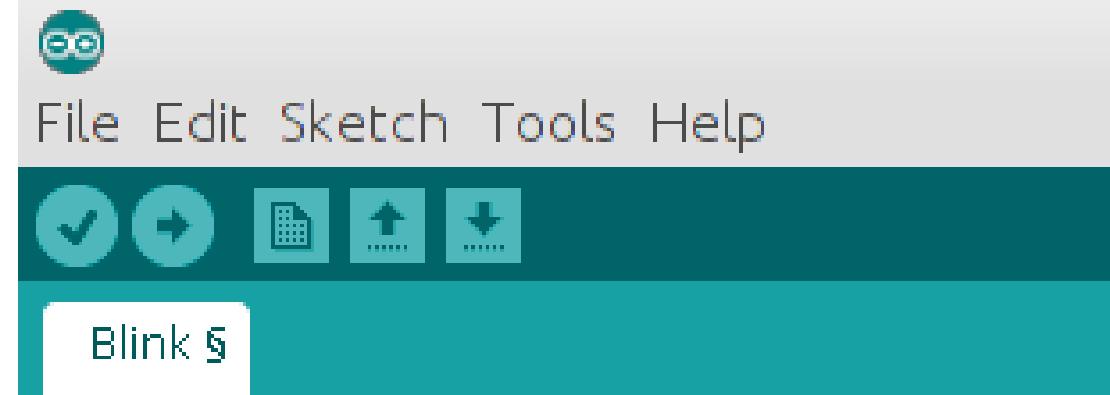
5. meer LEDs aansturen

- Hoe meer LEDs, hoe moeilijker
- Aanpassing van Blink nodig: veel copy-paste
- Als je er twee kan, kun je er ook meer!
- Maximaal 7 LEDs

Stroomschema



Code



```
File Edit Sketch Tools Help
  ✓  ↻  ⌂  ⌄  ⌅
Blink §

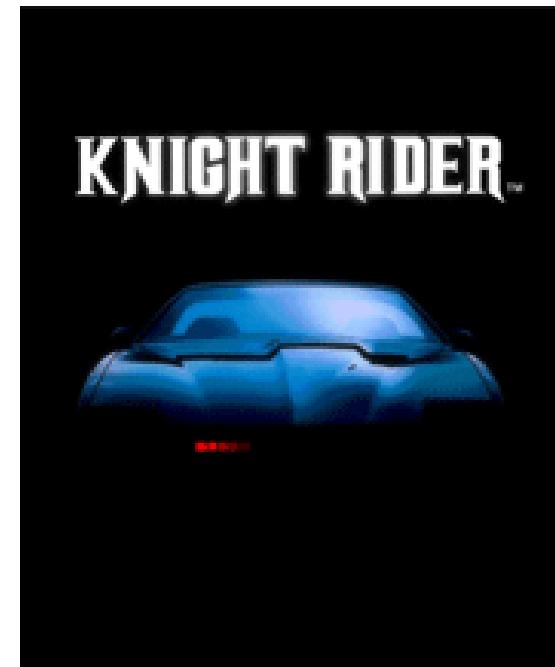
int led1 = 12;
int led2 = 13;

void setup() {
    pinMode(led1, OUTPUT);
    pinMode(led2, OUTPUT);
    //...
}

void loop() {
    digitalWrite(led1, HIGH);
    digitalWrite(led2, HIGH);
    //...
}
```

Meer LEDs: opdracht

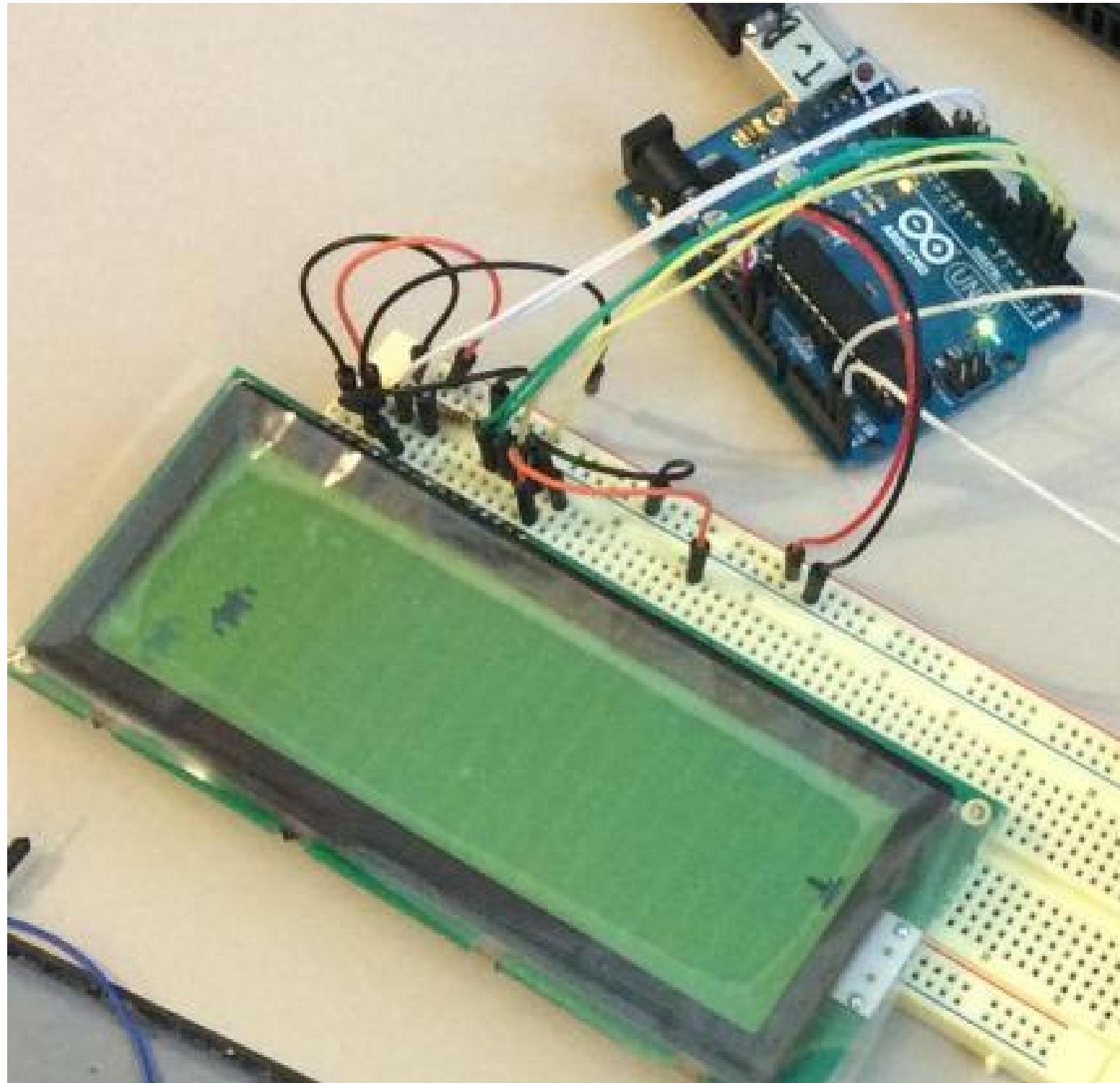
- Sluit meerdere LEDs aan
 - Zoals de LED op je breadboard
 - Gebruik de pinnen 13, 12, 11, etc.
- Pas de code van Blink aan
- Probeer een gaaf patroon te maken:
 - Disco
 - Stoplicht
 - K'nightrider



6. Toffe ideen?

?

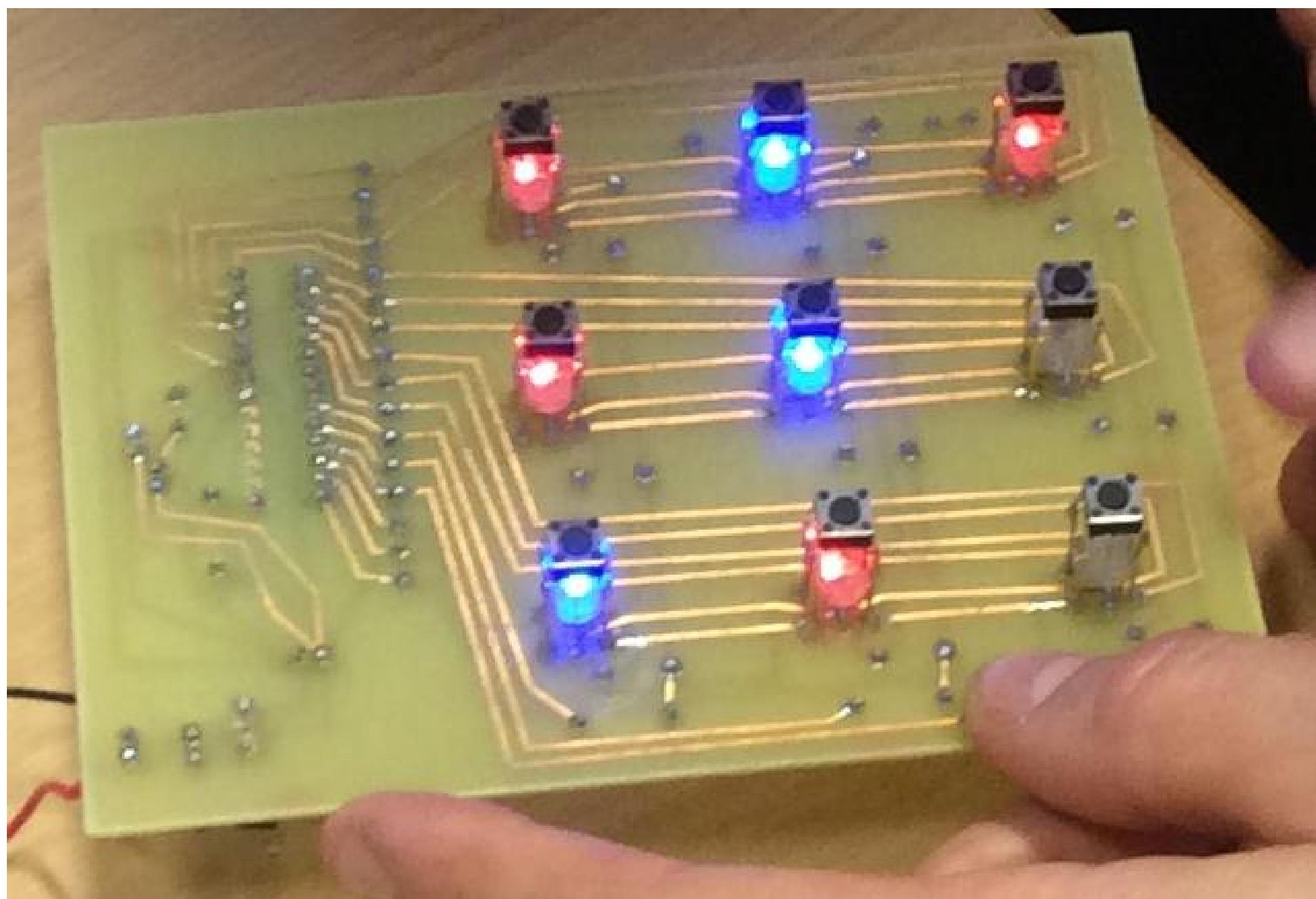
Arduino Invaders



LikeJar



TicTacToe



Lasermaze



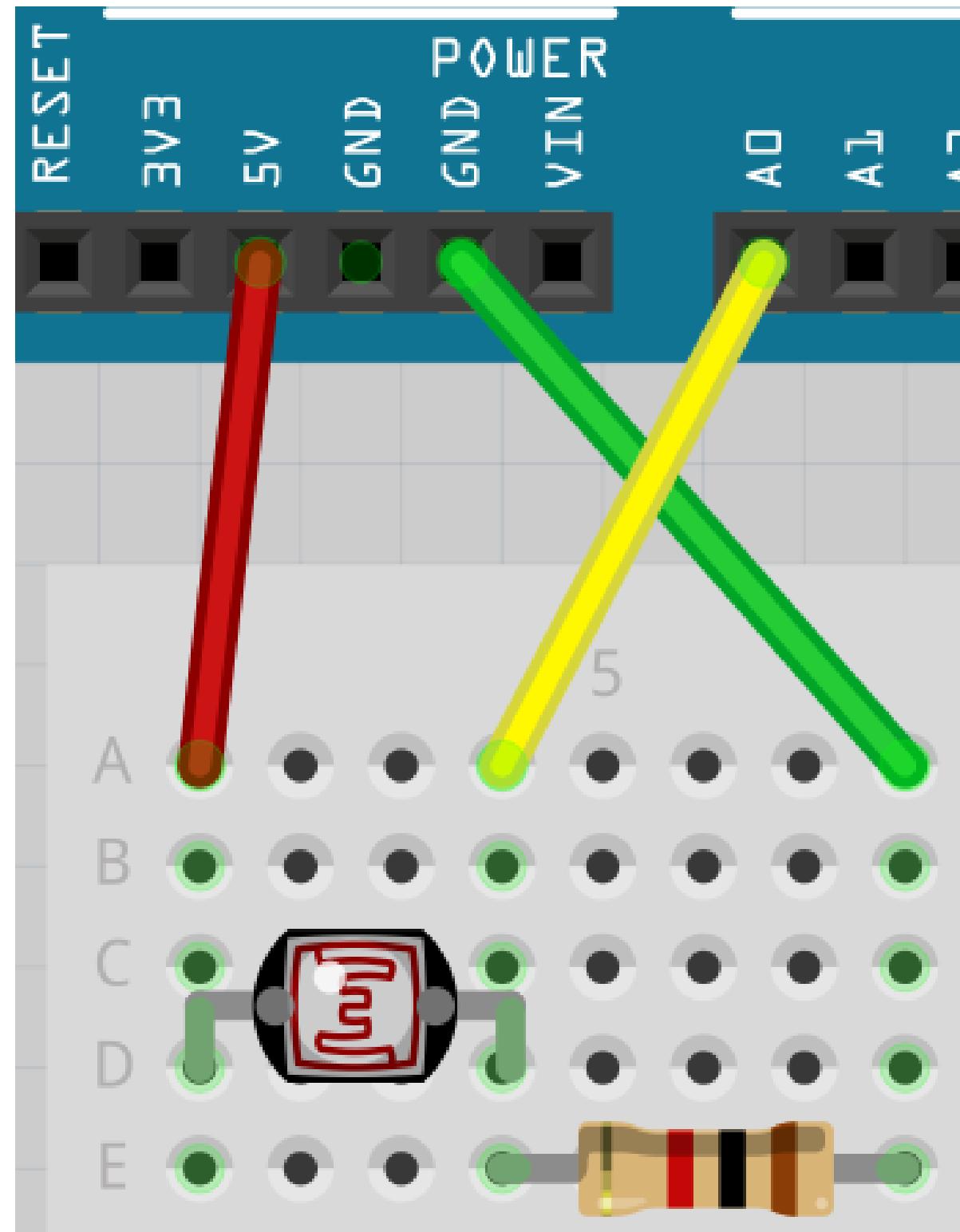
En nog veel meer

- Alle 3D printers

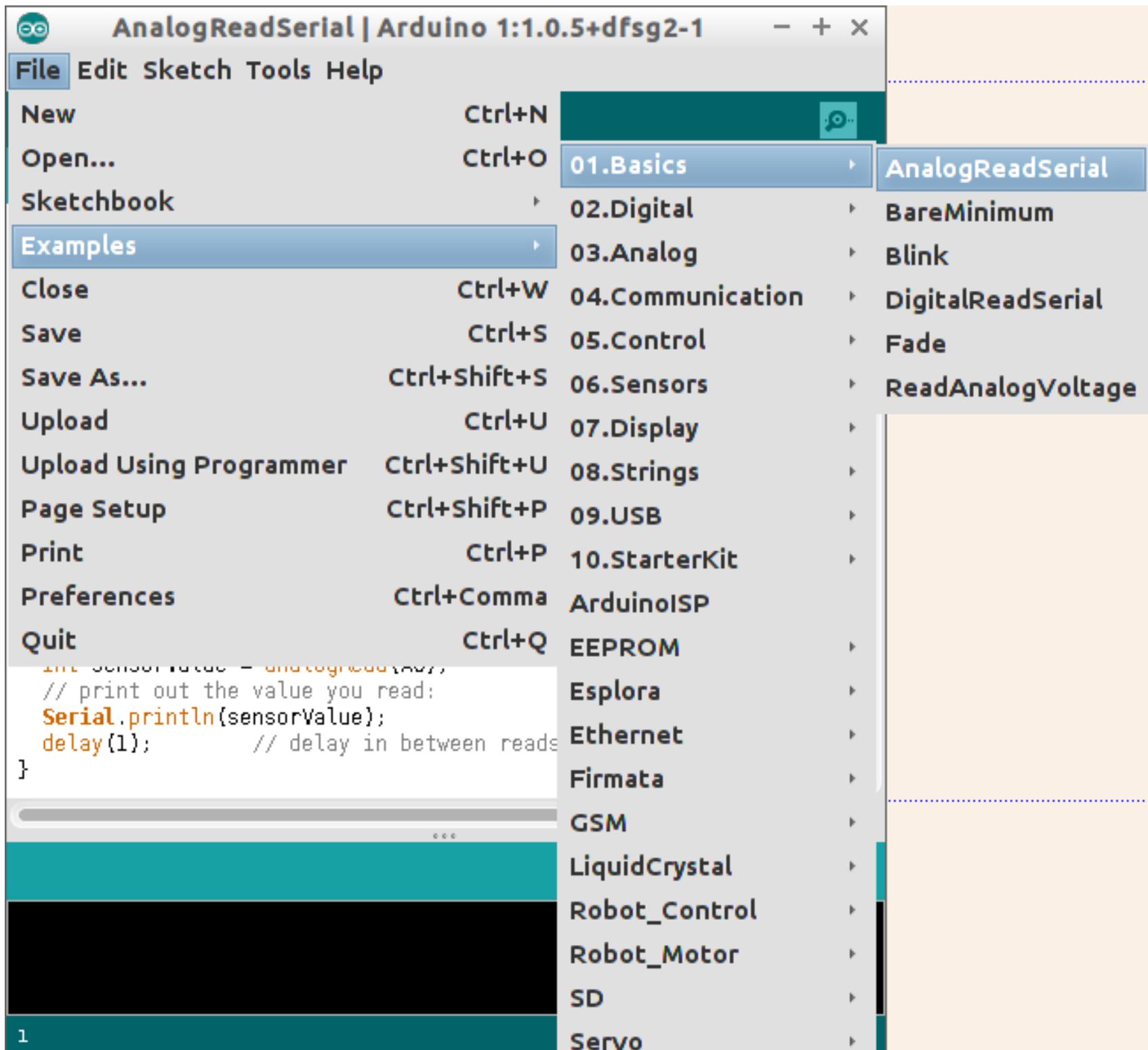
7. AnalogReadSerial: lichtsensoren lezen

- Lees een LDR
 - LDR: Light Dependent Resistance, een soort lichtsensor
- Simpelste input voorbeeld

Stroom schema



Code



Code

The screenshot shows the Arduino IDE interface with the title bar "AnalogReadSerial | Arduino 2:1.0.5+dfsg2-4". The menu bar includes File, Edit, Sketch, Tools, and Help. Below the menu is a toolbar with icons for save, upload, and download. The code editor window contains the "AnalogReadSerial" sketch. The code is as follows:

```
/*
 * AnalogReadSerial
 * Reads an analog input on pin 0, prints the result to the serial monitor.
 * Attach the center pin of a potentiometer to pin A0, and the outside
 * ends of the potentiometer's wiper and ground to ground and Vcc respectively.
 *
 * This example code is in the public domain.
 */

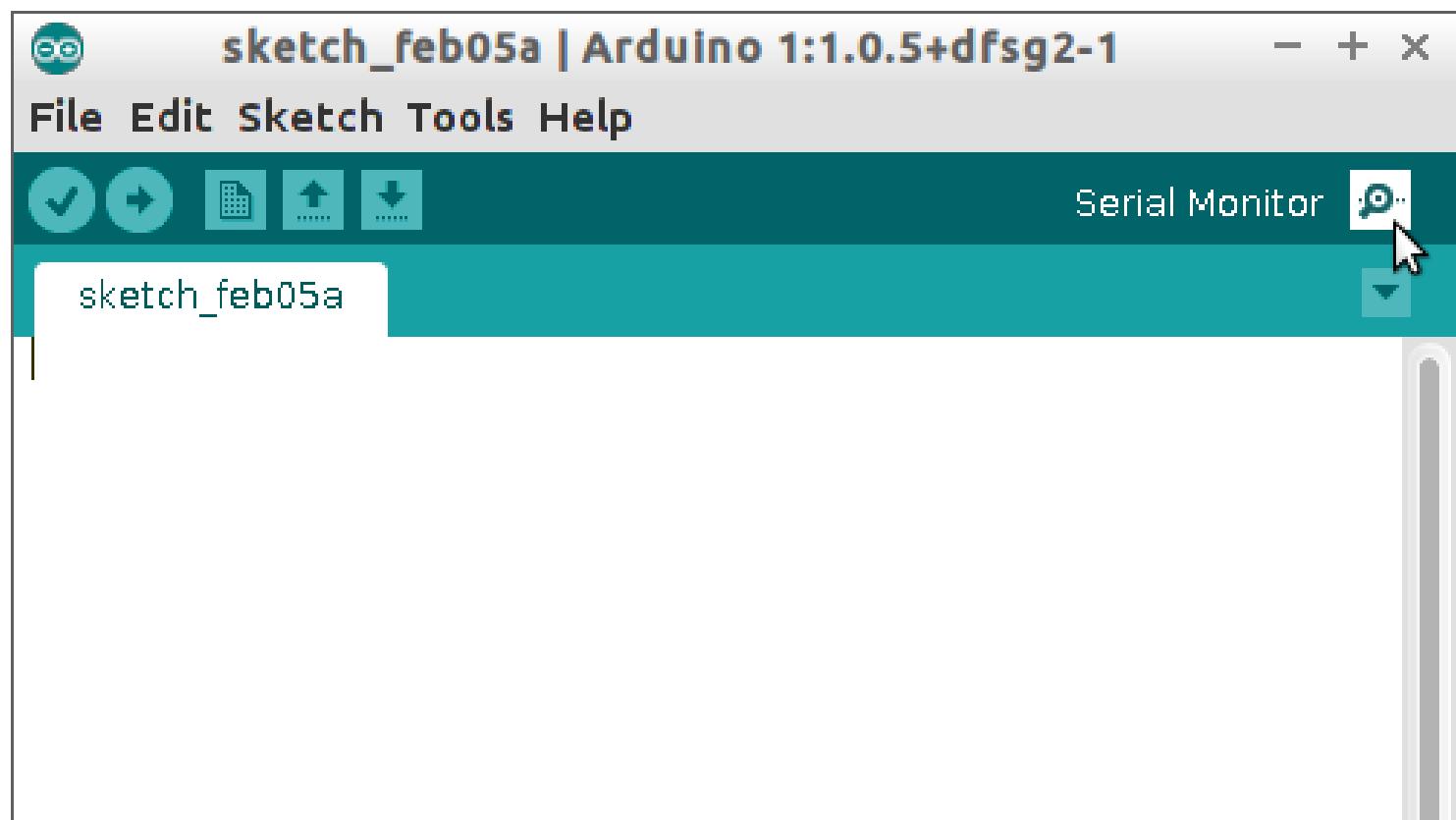
// the setup routine runs once when you press reset:
void setup() {
    // initialize serial communication at 9600 bits per second:
    Serial.begin(9600);
}

// 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
}
```

The status bar at the bottom indicates "1" and "Arduino Uno on /dev/ttyACM0".

Serial Monitor

- Wordt gebruikt om waarden te lezen en te schrijven
- Erg belangrijk om fouten mee op te sporen!



Opdracht

- Sluit de LDR aan:
 - 5V via LDR naar A0, van A0 via weerstand naar GND
 - Upload het voorbeeld 'analogReadSerial'
 - Bekijk de output in de Serial Monitor
-
- Dan:
 - Laat de LEDs reageren op de sensor inputs. Tip: Upload het voorbeeld 'Controls | ifStatementConditional'

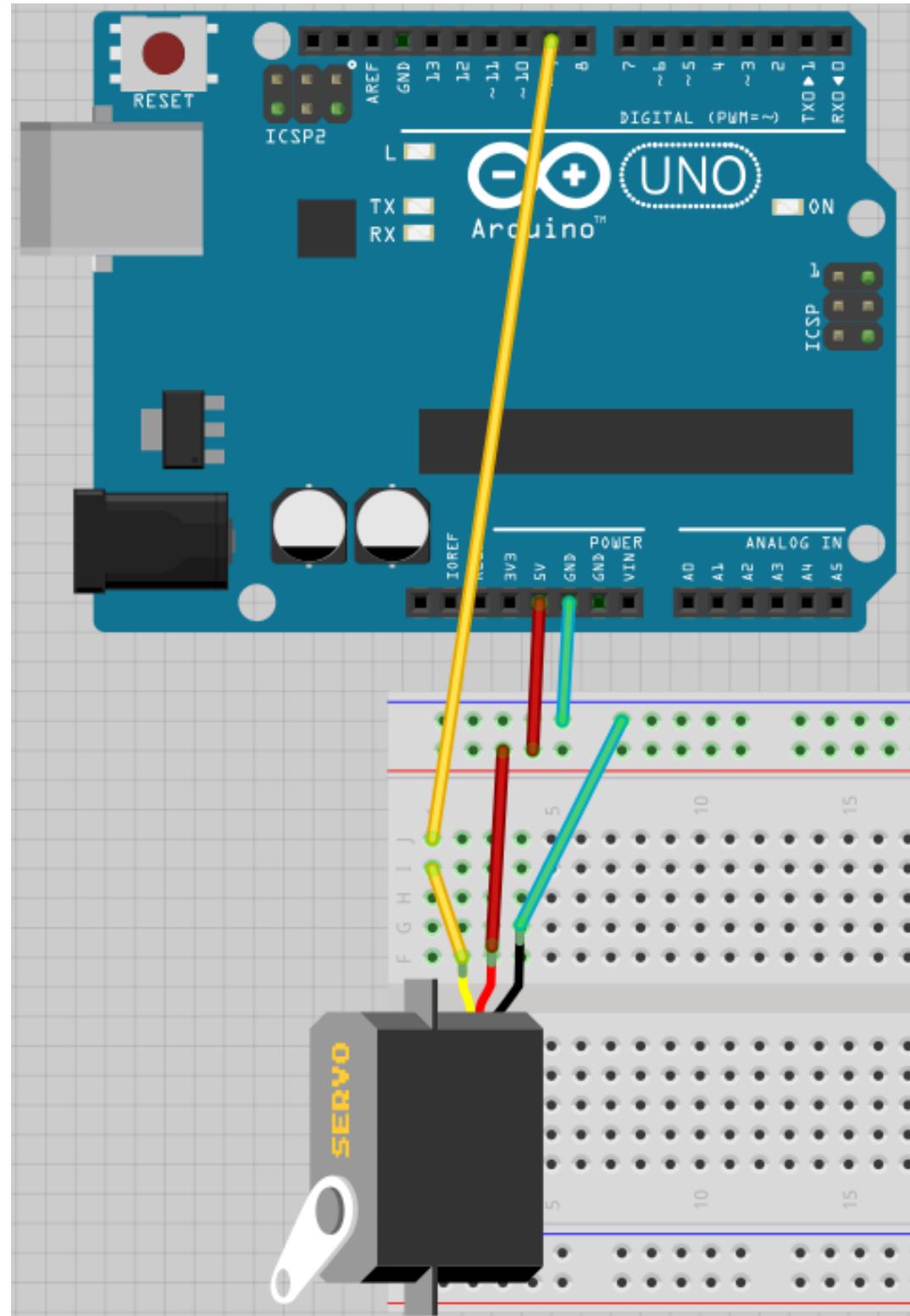
```
const int analogPin = A0;  
const int ledPin = 13;  
const int threshold = 400;  
void setup() {  
    pinMode(ledPin, OUTPUT);  
    Serial.begin(9600);  
}  
void loop() {  
    int analogValue = analogRead(analogPin);  
    if (analogValue > threshold) {  
        digitalWrite(ledPin, HIGH);  
    }  
    else {  
        digitalWrite(ledPin, LOW);  
    }  
    Serial.println(analogValue);  
    delay(1);  
}
```

If Statement
Conditional

8. Sweep: servomotor

- Simpelste voorbeeld van een actuator
 - Actuator: een onderdeel dat iets kan bewegen
- Servomotor:
 - Motor die je in een precieze hoek kunt zetten
 - Motor kan niet altijd rond
 - Gebruikt in scharnieren van robots
- Voorbeeld: 'Servo | Sweep'

Stroomschema





Sweep S

```
#include <Servo.h>

Servo myservo; // create servo object to control a servo
                // a maximum of eight servo objects can be created

int pos = 0; // variable to store the servo position

void setup()
{
    myservo.attach(9); // attaches the servo on pin 9 to the servo object
}

void loop()
{
    for(pos = 0; pos < 180; pos += 1) // goes from 0 degrees to 180 degrees
    {                                // in steps of 1 degree
        myservo.write(pos);          // tell servo to go to position in variable 'pos'
        delay(15);                  // waits 15ms for the servo to reach the position
    }
    for(pos = 180; pos>=1; pos-=1) // goes from 180 degrees to 0 degrees
    {
        myservo.write(pos);          // tell servo to go to position in variable 'pos'
        delay(15);                  // waits 15ms for the servo to reach the position
    }
}
```

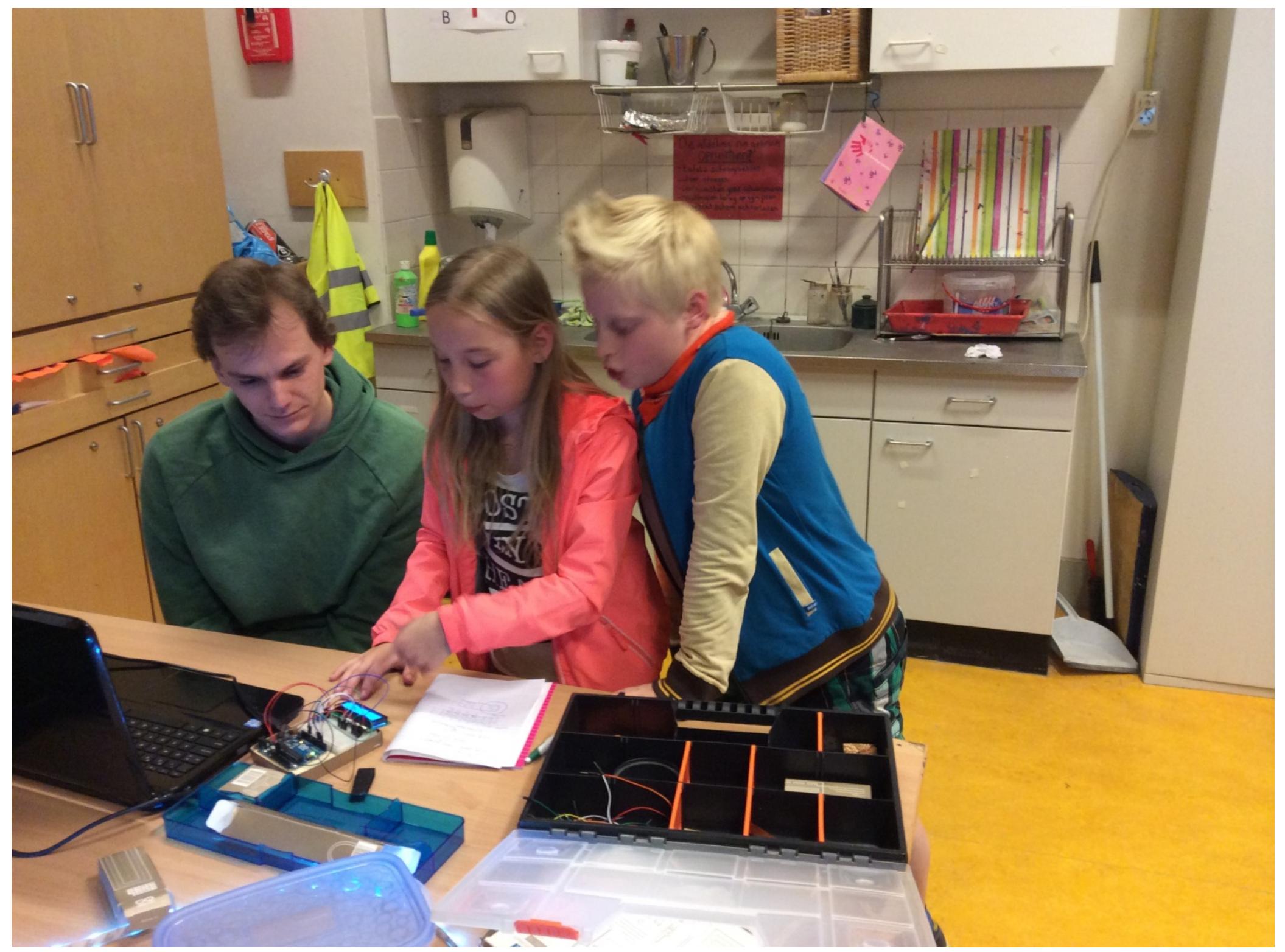
Opdracht

- Sluit de servo aan
- Upload 'Servo | Sweep'
- Bekijk wat de servo doet
- Dan:
 - laat de servo reageren op de sensor

9. Afsluiting

?





Arduino cursus

- Elke vrijdag van 19:00-22:00
- Bij De Jonge Onderzoekers, Dirk Huizingastraat 13
- Kosten: 1 euro per les
- Iedereen is altijd welkom

