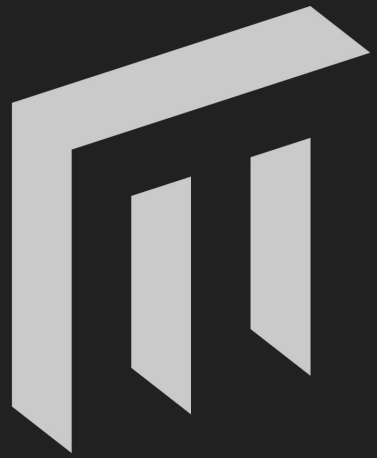

HI. HOW ARE YOU



MALMÖ
UNIVERSITY

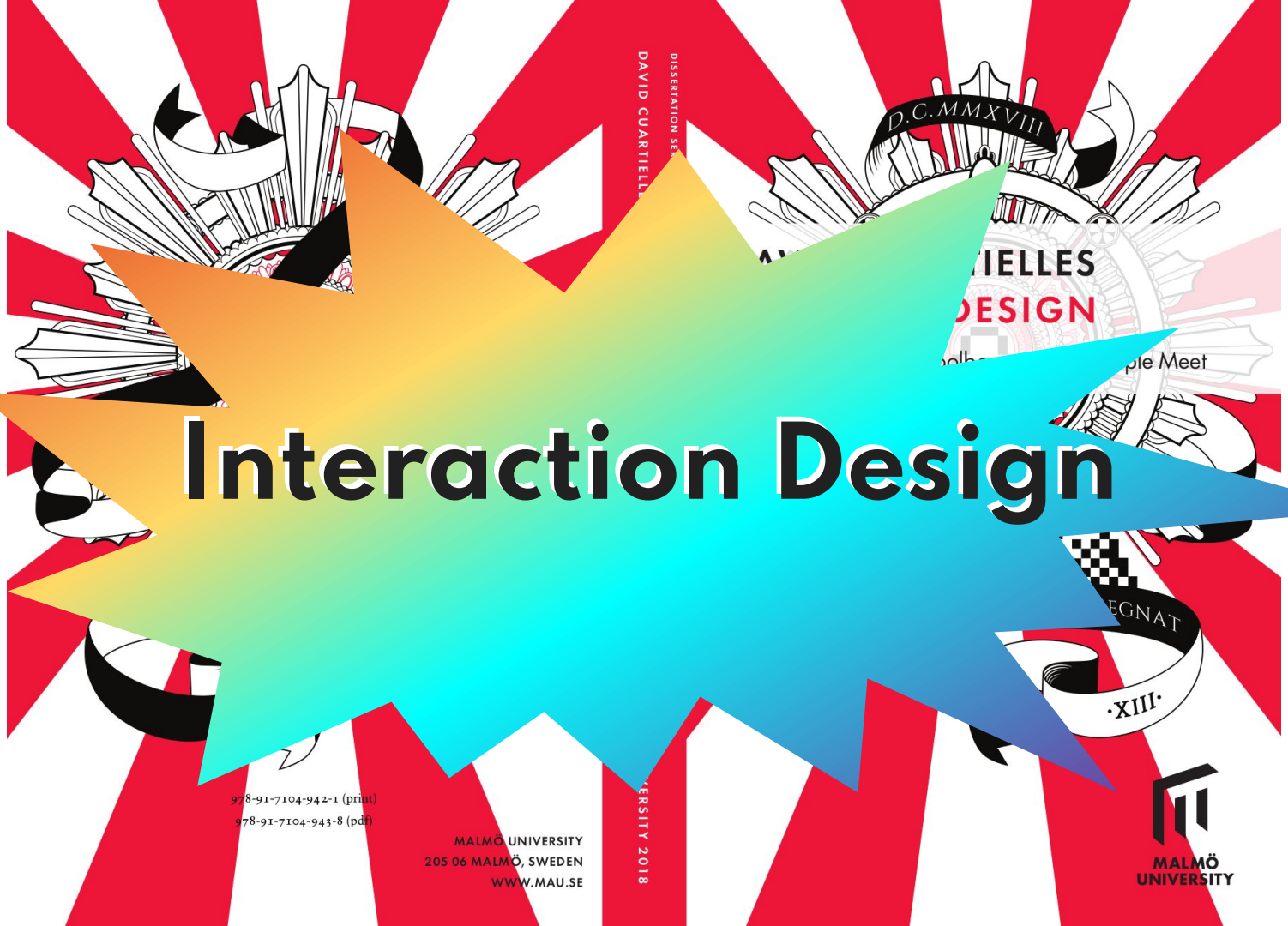
Arduino in Education

A journey into STEAM


TRUSTED TEACHER - DEALER AT MOLLAN SQUARE
SKÅNEMEJERIER
FIND THE BLUE BIKE!!

MALMÖ
UNIVERSITY

ARDUINO

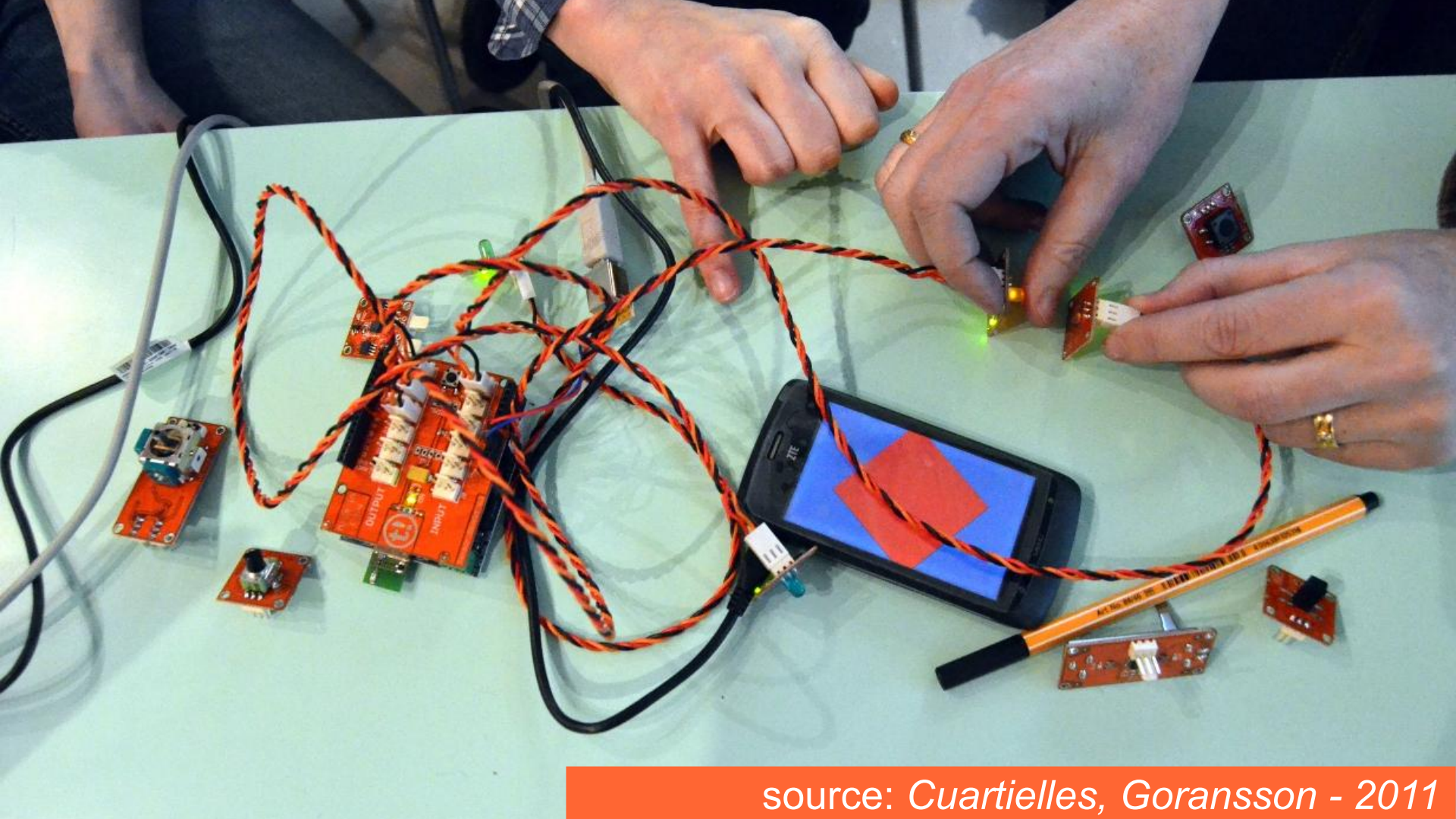


Interaction Design

IxD is a discipline looking at the interaction between [non] humans by means of digital artifacts [products and services].

Cuartielles, 2024


Devuan

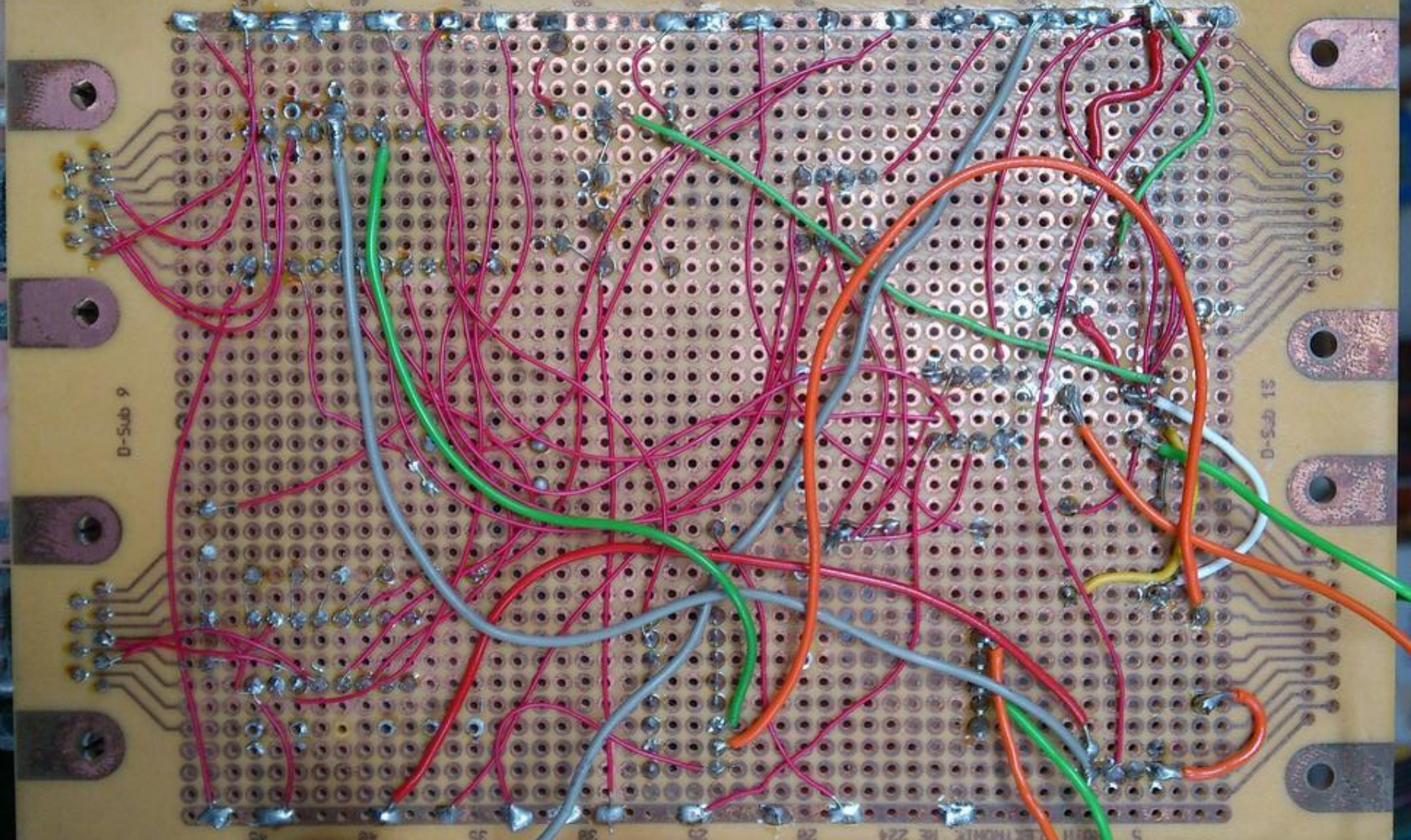


source: *Cuartielles, Goransson - 2011*

People use platforms to learn and create things.

NULL

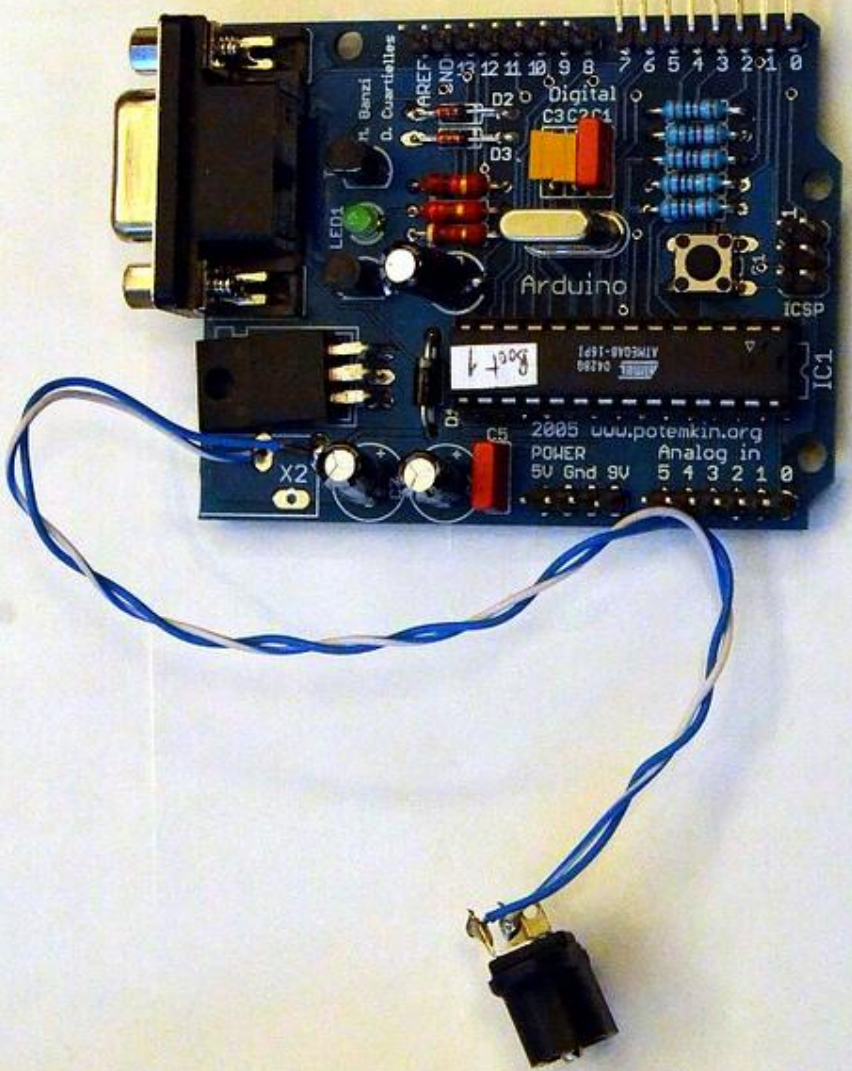
SERIAL


D-Sub 9
D-Sub 15


Bild

Annoying Chair – K3 – 2004 December

How replicable is this?


AREF
GND
13 12 11 10 9 8
7 6 5 4 3 2 1 0
Digital
D2
D3
C3 C2 C1
LED1
M. Banzi
D. Cuartielles
Arduino
ICSP
IC1
C5
X2
2005 www.potemkin.org
POWER
Analog in
5V Gnd 9V
5 4 3 2 1 0

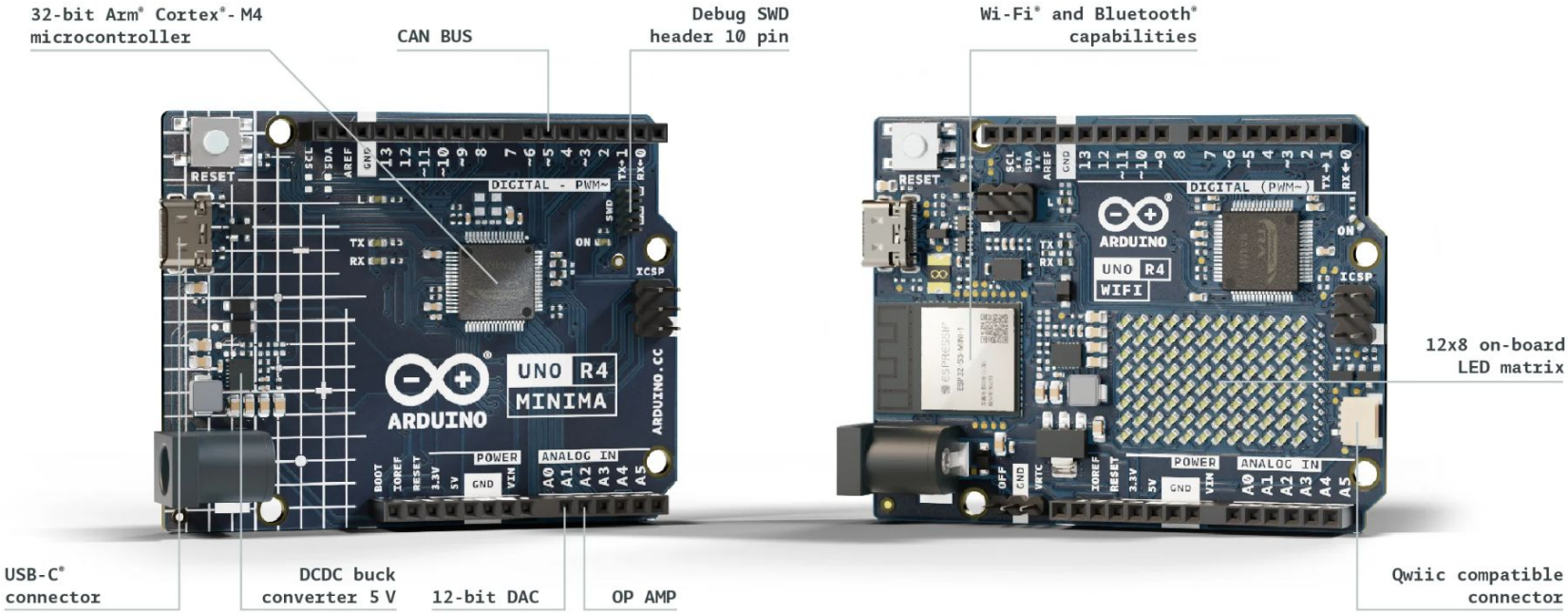
THE FIRST ARDUINO THING

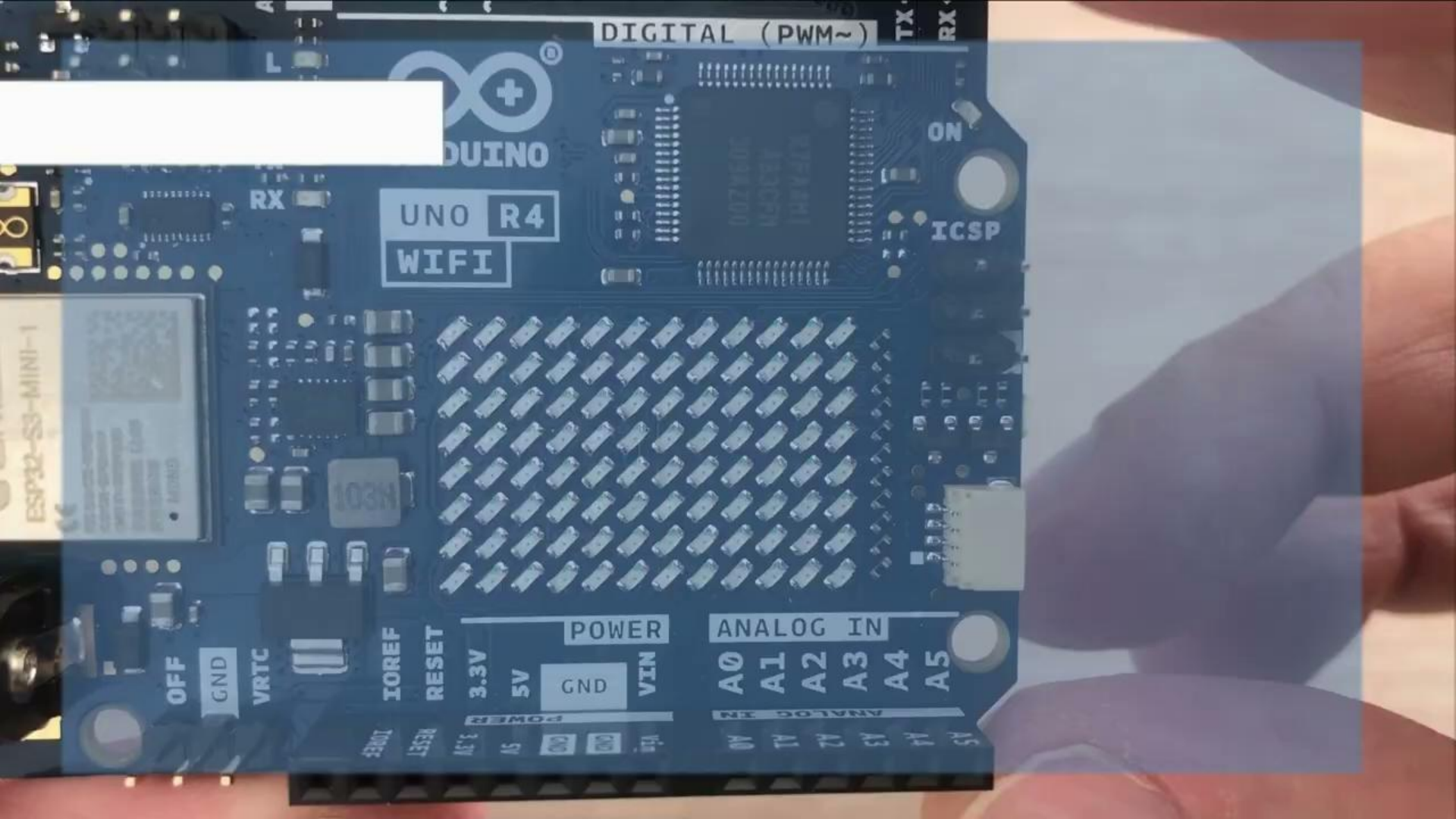

source: *Fallen - 2005*

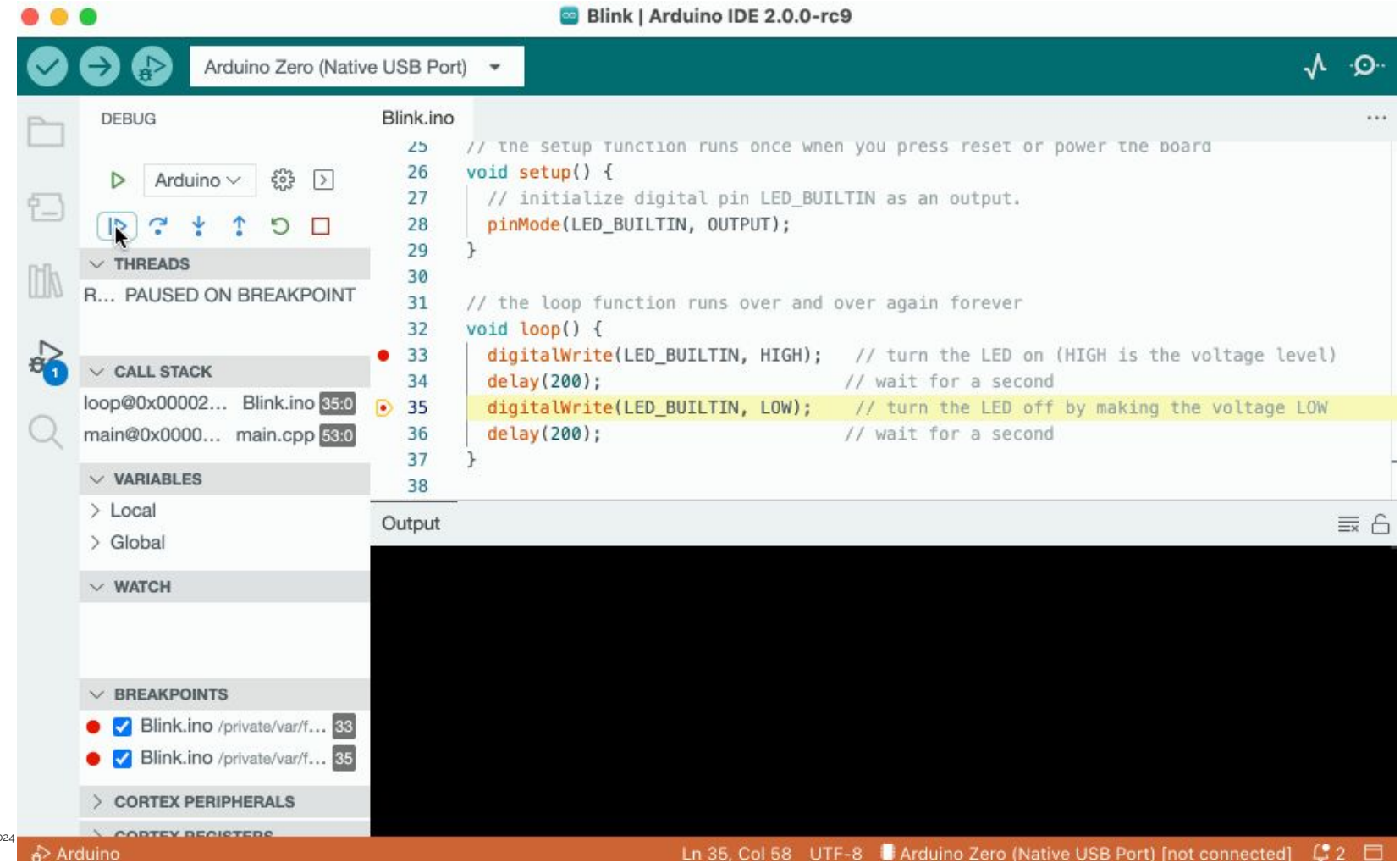

DELL

What is Arduino?


ARDUINO
UNO R3
DIGITAL (PWM~)
POWER
ANALOG IN

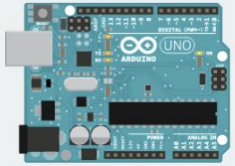

32-bit Arm® Cortex®- M4 microcontroller
CAN BUS
Debug SWD header 10 pin
Wi-Fi® and Bluetooth® capabilities
12x8 on-board LED matrix
USB-C® connector
DCDC buck converter 5 V
12-bit DAC
OP AMP
Qwiic compatible connector
UNO R4 MINIMA
UNO R4 WIFI
ARDUINO
DIGITAL - PWM~
DIGITAL (PWM~)
POWER
ANALOG IN
RESET
ICSP
ARDUINO.CC


DIGITAL (PWM~)
UNO R4
WIFI
RX
ON
ICSP
POWER
ANALOG IN
OFF
GND
VRTC
IOREF
RESET
3.3V
5V
GND
VIN
A0
A1
A2
A3
A4
A5



… the Arduino IDE is downloaded once every 2’5 seconds …

WHAT IS ARDUINO?



BUY AN ARDUINO

LEARN ARDUINO

DONATE

ARDUINO IN THE CLOUD

CAREERS

ARDUINO CLOUD

Develop your code in the cloud and build smart IoT projects!

ARDUINO DAY 2023

Let's celebrate together!

Check the program of Arduino Day 2023 and connect with incredible stories and projects

Discover more!

PLC

Arduino PLC IDE

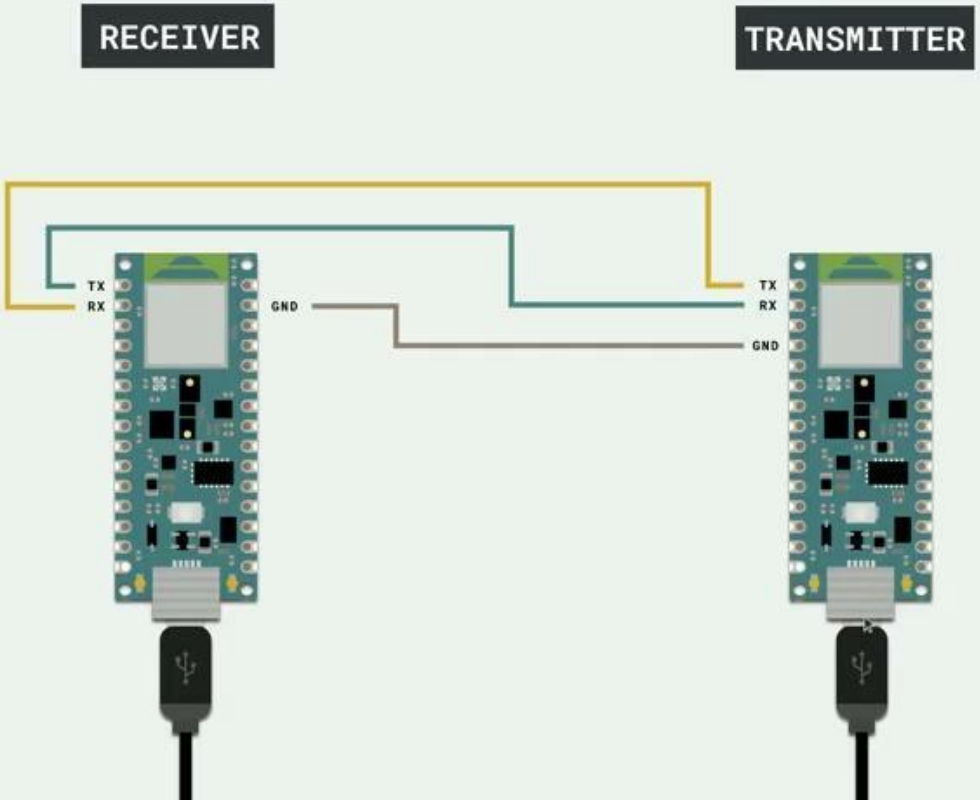
Bring **IEC 61131-3** programming languages to Arduino

Check it out now!

VINEYARD PEST MONITORING WITH ARDUINO PRO

Cuartielles -

Help



… over 60.000.000 people visit the Arduino website yearly …

THE KEY ASPECT?


Sorry We're
OPEN

But we came to talk about ...

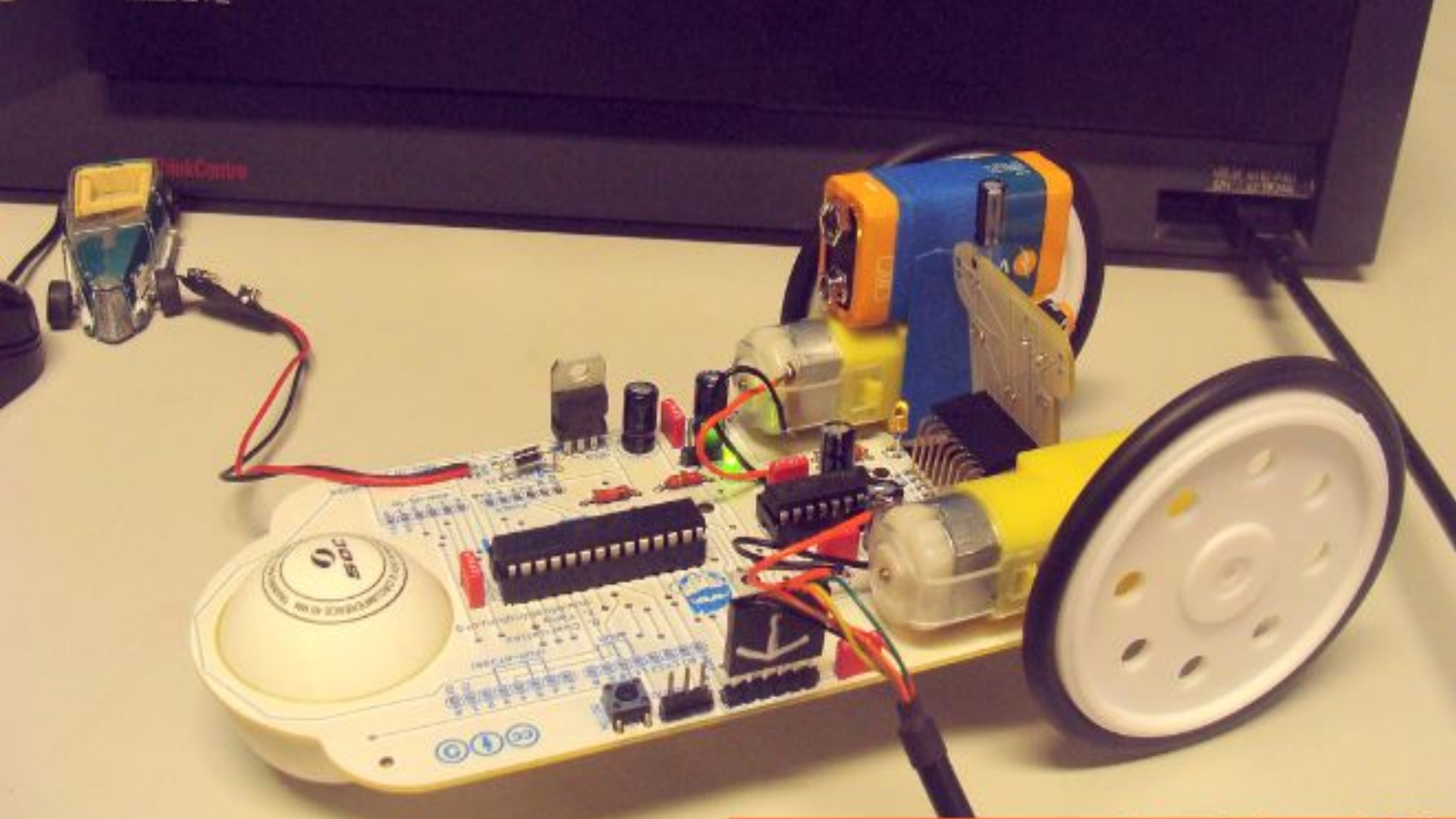
... pedagogical models (and reflections)

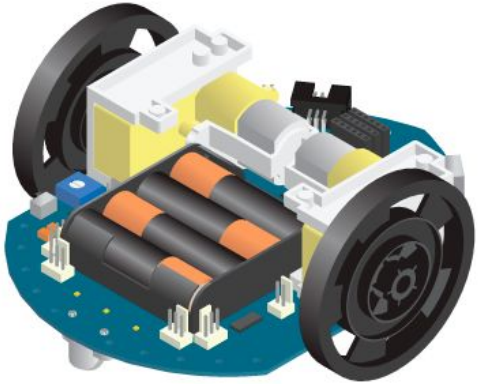
- Different ways of approaching technical materials in class.
- Mixing technology with other materials.
- Maximising outreach.
- Thinking about limitations.

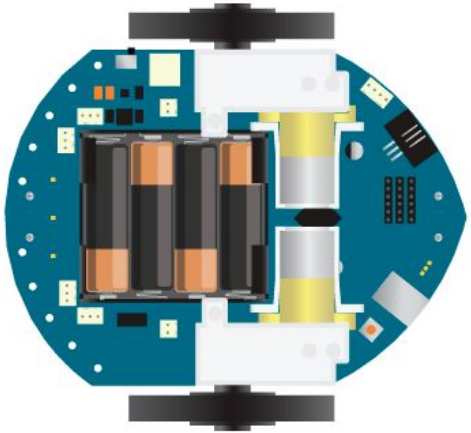
The same way we were teaching, other teachers decided to use this platform for STEAM teaching.

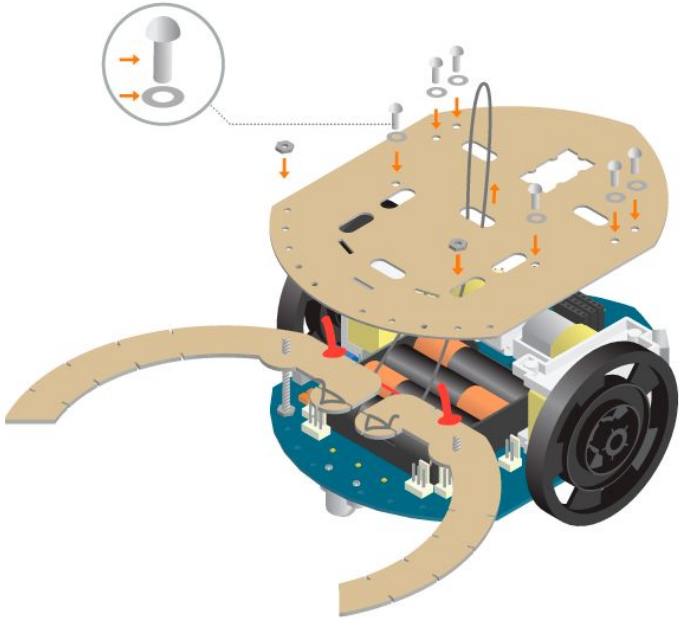
STEAM: Science Technology, Engineering, Arts, and Math

2010 MEXICO - FARO DE ORIENTE





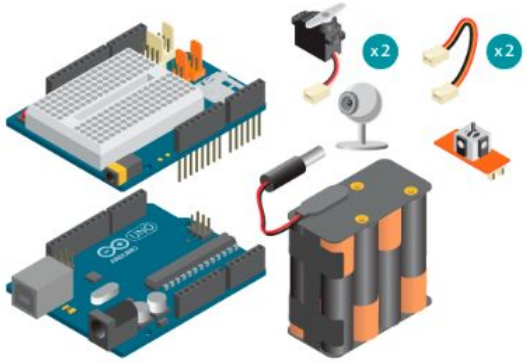


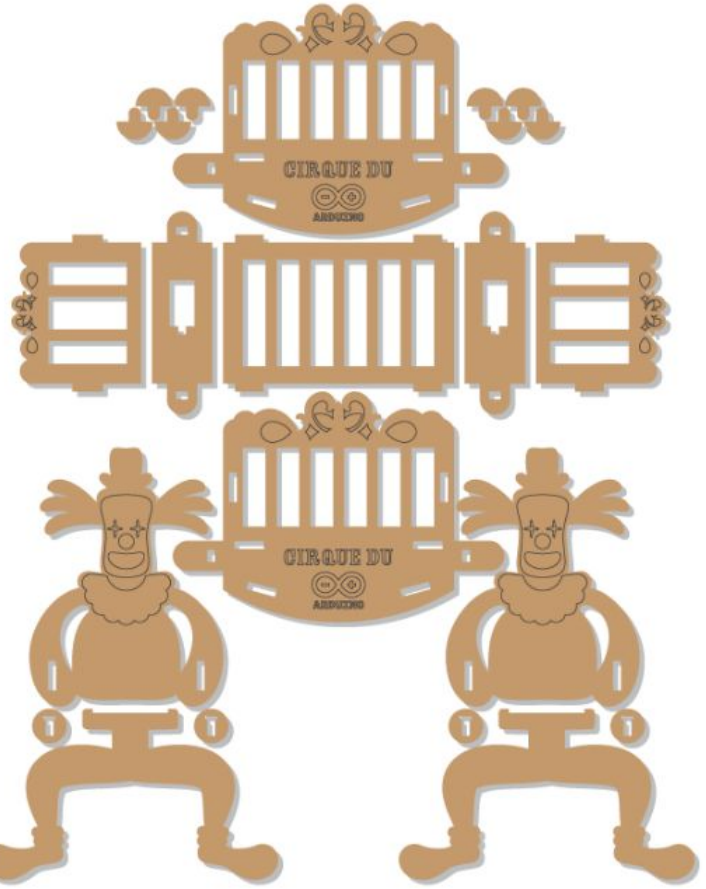


2014 - 2016 SPAIN - ETOPIA


KIDS
26/06/2014

2013 - 2019 SPAIN





```
//Declare the capacitive sensor
CapacitiveSwitch sensor=CapacitiveSwitch(2,3);

void setup(){
  //initialize the capacitive sensor. Threshold is 400
  sensor.config(400);

  //initialize the servo motor
  pull.attach(9);
}
void loop(){
  if(sensor.getState()){
        //If the capacitive sensor is touched, pull the st
    pull.write(0);
```

create.arduino.cc

create.arduino.cc/ctc/101/

CTC 101

ENGLISH (EN)

HOME | BLOCK 1 | BLOCK 2 | BLOCK 3 | BLOCK 4 | BLOCK 5 | REFERE

BLOCK 1 - PROGRAMMING

Get started and learn the basics of programming. Develop an interactive snake, a video game or a customized clock using the programming environment Processing.

BLOCK 2 - SPORTS

Learn the basics of digital technologies to control digital actuators and read digital sensors. Build and play with small electronic games that simulate sports like basketball, fencing and pong among others.

BLOCK 3 - MAGIC

Learn about the magic of analog signals and the serial port. Build projects that introduce sound and images that highlight analog signals.

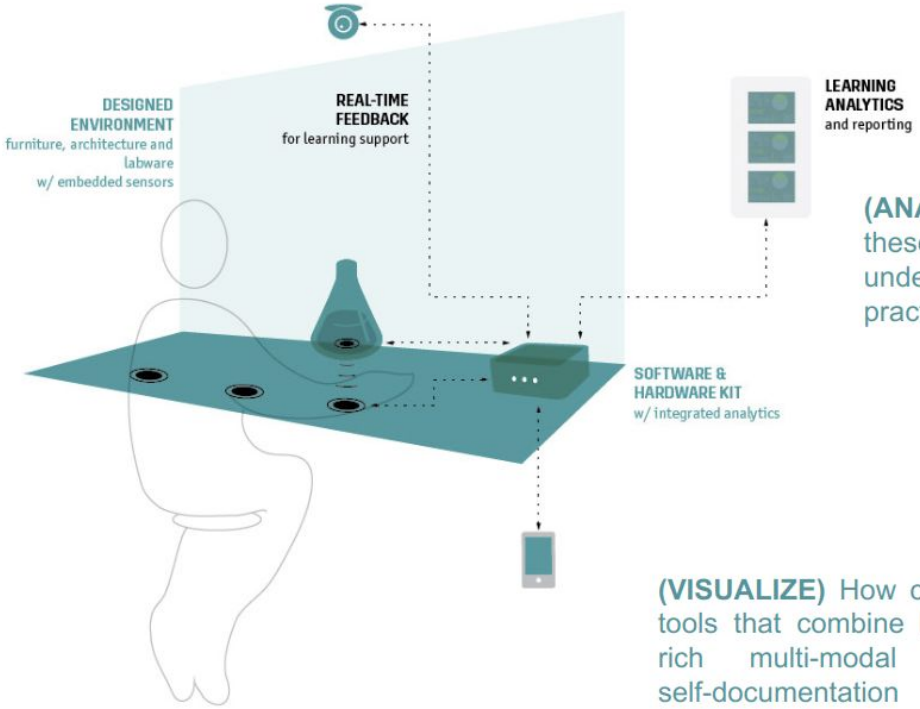
BLOCK 4 - ROBOTS

Learn the basics on how to control motors and sensors. Build different robots and add movement to them by using standard and continuous servos.


Dinàmica de

pelars.

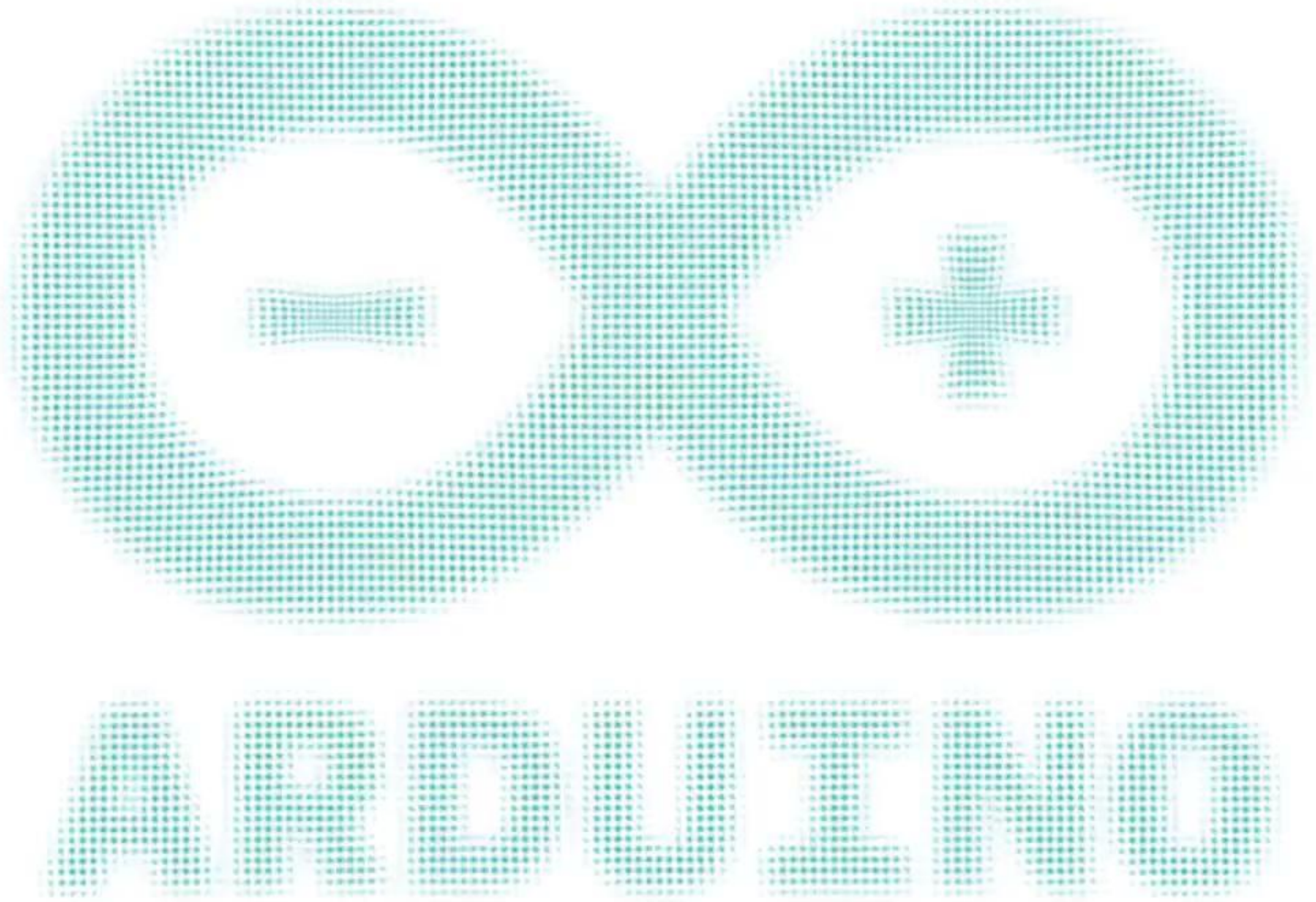
(CREATE/CAPTURE) What new data analytics can be derived from the hands-on learning of STEM subjects?



(ANALYZE/REASON) How can these data analytics be used to understand and support practice-based learning?

(VISUALIZE) How can we develop visualization tools that combine learning analytics data from rich multi-modal sensors and students self-documentation to provide meaningful

2016 EU PROJECT


ARDUINO


2019 SPAIN

tierra - GrecoSat II

Puerto SERIE COM5 STOP

A: 11:31:49
HA: 040519
: 41.752735°
N: -0.892613°
T: 288.00 m
Lhor: 0.58 m/s
MBO: 323.25°
T: 9
ELvert: -0.1 m/s

Altitud Barométrica
Altitud m
318.14

Batería
Voltaje V
7.59

GrecoSat II

Estados
BALIZA
VIDEO
UMBRAL
ESCUDO

Comandos de radio
ABRE ESCUDO
CIERRA ESCUDO
PARACAIDAS

Acelerómetro
AX -0.28
AY -0.99
AZ 1.65

gnitudes físicas
978.26 P hPa
32.18 Hum %

What I really wanna know is ...

What is the impact of the Arduino platform in teaching? Does it help students learn about embedded technology?

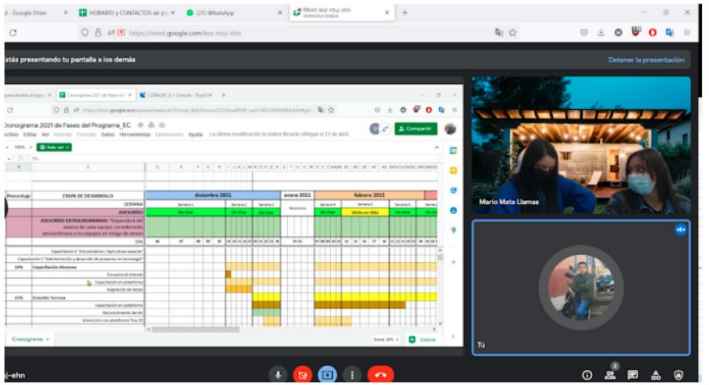
IDSCEA
INSTITUTO PARA EL DESARROLLO DE LA SOCIEDAD DEL CONOCIMIENTO DEL ESTADO DE AGUASCALIENTES
Contigo al 100

ELECTRONIC CATS

IDSCEA
INSTITUTO PARA EL DESARROLLO DE LA SOCIEDAD DEL CONOCIMIENTO DEL ESTADO DE AGUASCALIENTES
Contigo al 100

ELECTRONIC CATS

Evidencias de visita



REPORTE SEMANA #19

No. 11 de 12

Capacitación de misión espacial del
23 al 26 de Mayo de 2022

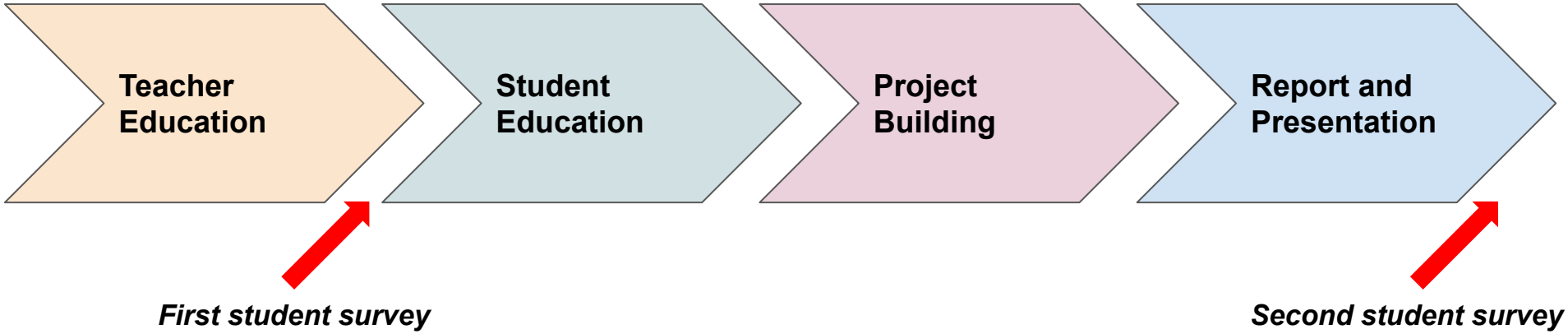
DESCRIPCIÓN BREVE

Actividades desarrolladas semanalmente para el proyecto: Aguascalientes al espacio 2022.

2022 AGUASCALIENTES - MX


2022-05-23 15:26:51
nvernadero
PTZ
Zoom
Enfoq.
Iris
Rot. hor.
Preset
Crucero
PTZ
Color
Configuración
Reproducción

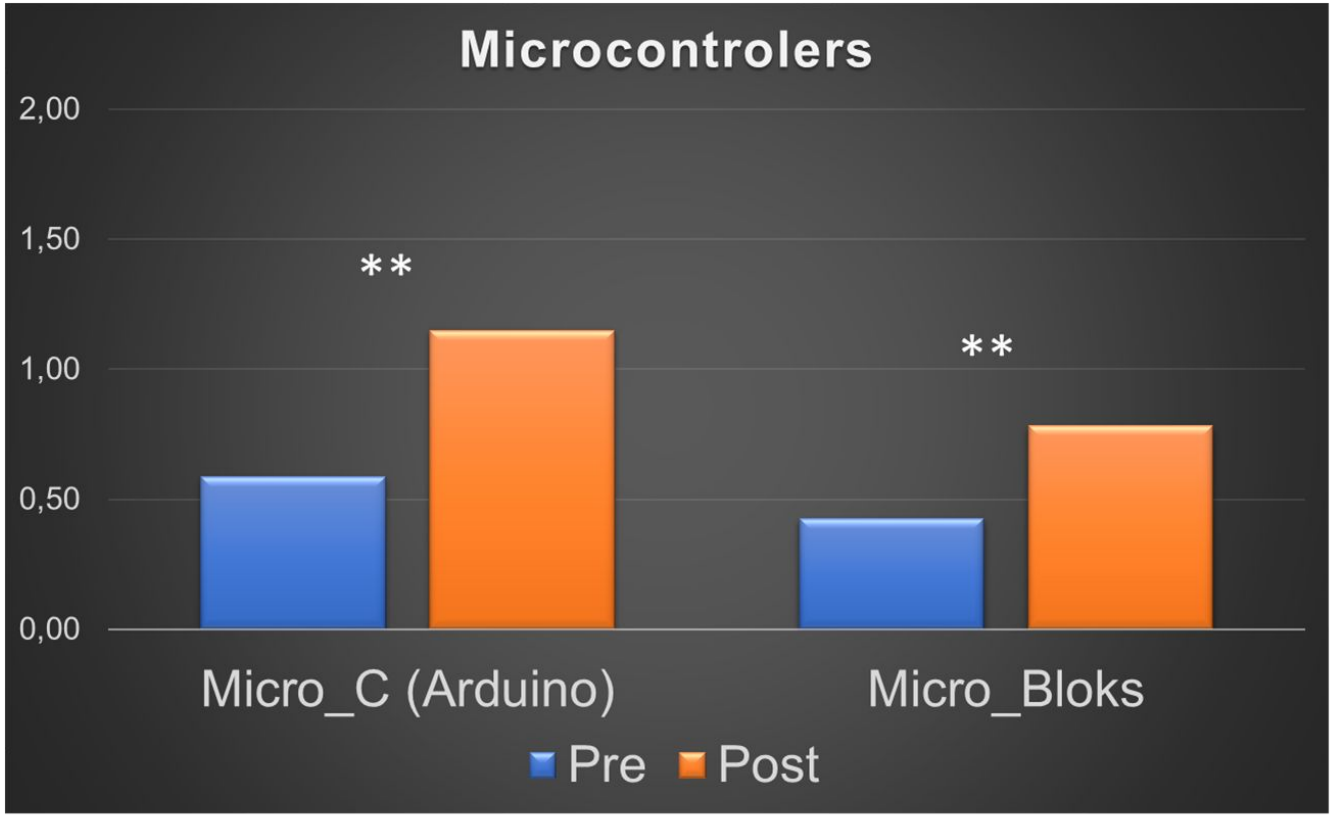
The survey process.




Encuesta de Entrada Profesores

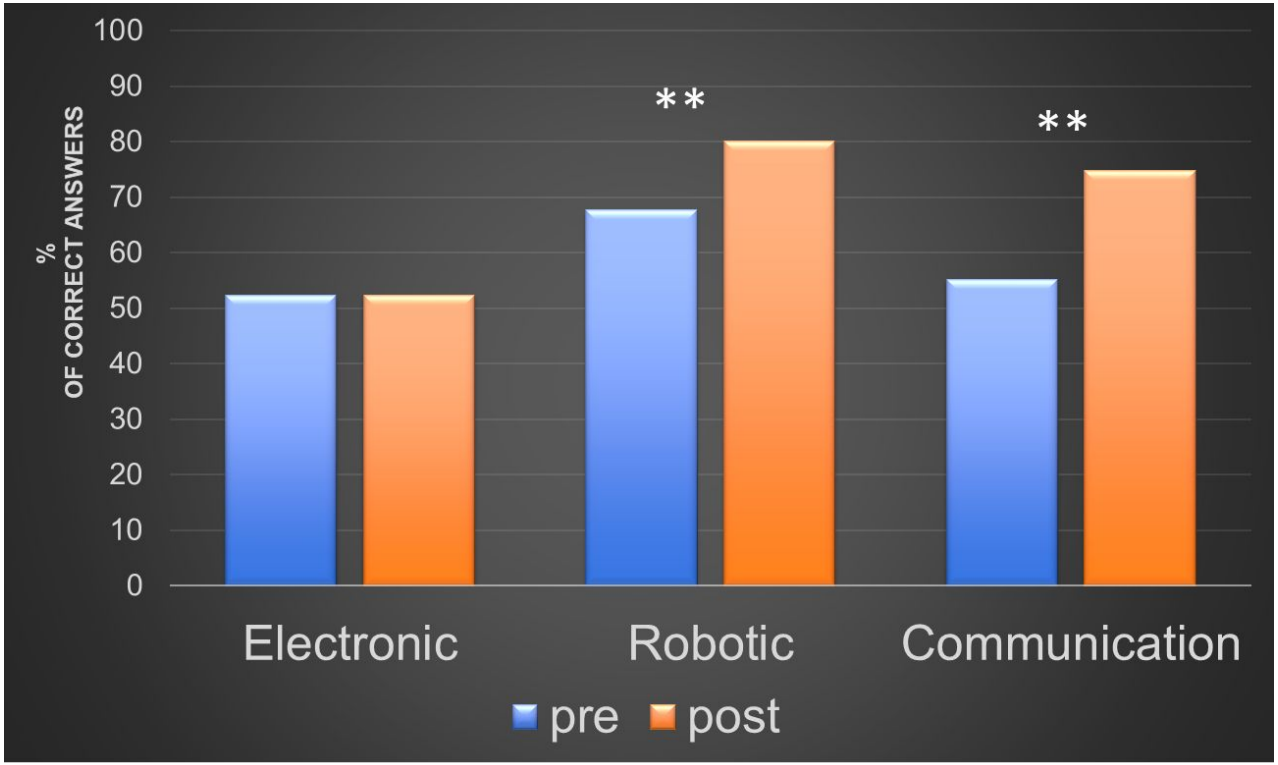

AGUASCALIENTES
AL ESPACIO
SATELITAL
CHALLENGE
GOBIERNO DEL ESTADO

Self-reported STEAM knowledge



**P-value <.01; ** P-value <.05

Test of STEAM competence



**P-value <.01; ** P-value <.05

List of open questions to consider

- Classes at multiple speeds
- Labs vs. personal kits: when and where?
- Kits vs. toolboxes: what is best?
- AI specific: dependency layers (C-NN-platforms)
- Guided vs. exploratory courses
- Expectations: And when novelty has wear off?

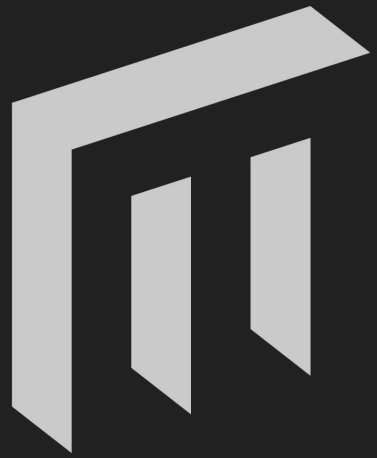
Let’s wrap this up in style.

There will always be people looking into creative uses of technology.

JAKARTA LIGHT INSTALLATION

Thanks 👩‍🎓👩‍🎓 🇬🇷 for coming by!

Thanks 
for coming by!



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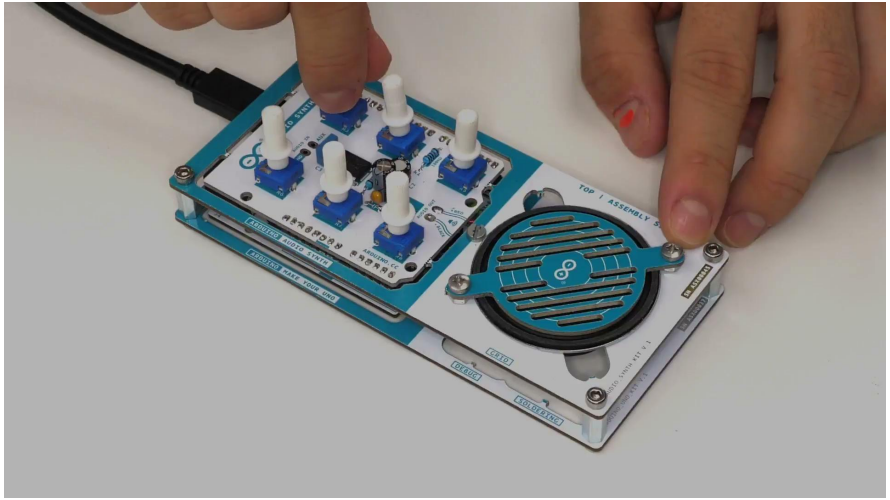
UNIVERSITY


POKEMON GO




MUTANT
LIFESPAN
COLOUR
CONTROL
FUNC
ROOT+
ROOT-
SCALES
ALGO
START
TEMPO
REC
CLEAR
CLONE

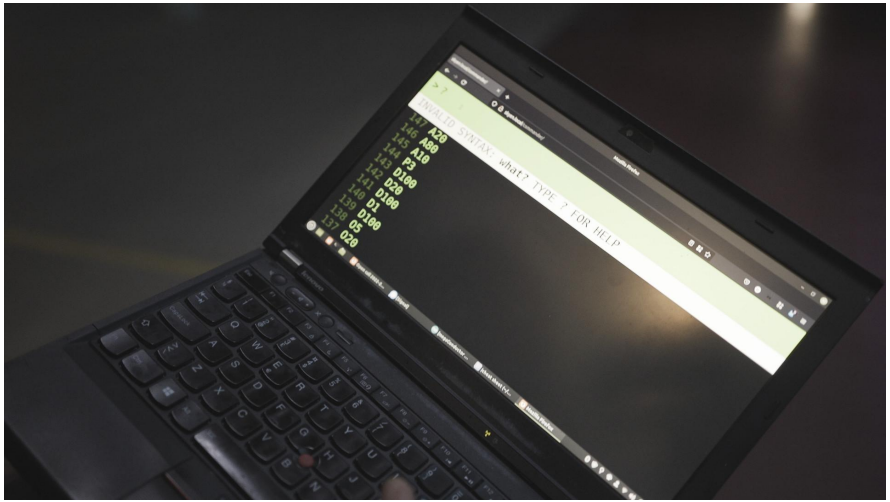

SYNTAX: what? TYPE '?' FOR HELP

Image Caption: Kelly Heaton, 2017. Left: "Donald Trump (The Big Hack)." Center: "Vladimir Putin (The Operational Amplifier)." Right: "Hillary Clinton (The Big Shock)." All works are oil on canvas, 18" x 18" x 1.5."

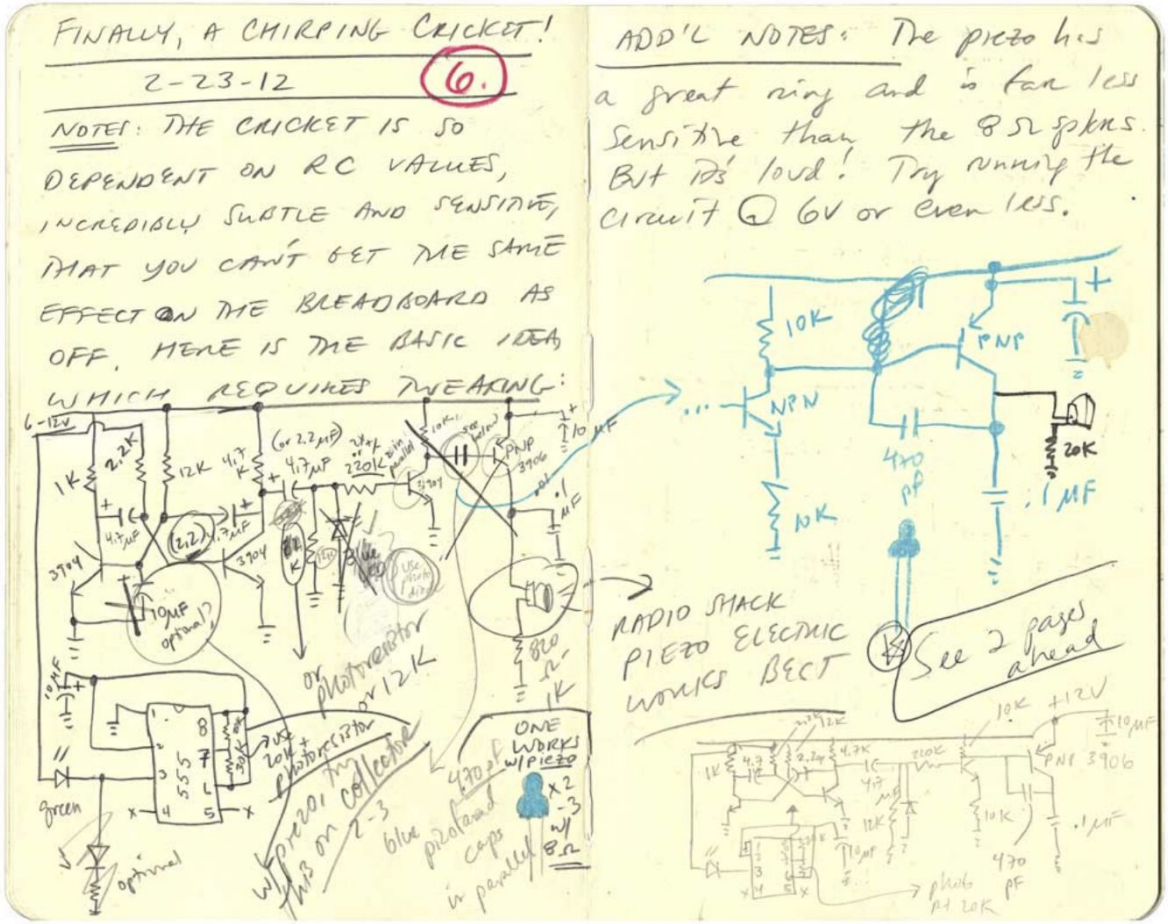


Image caption: Kelly Heaton, "Finally a chirping cricket," 2012. Notebook sketch from my struggle to learn electrical engineering.

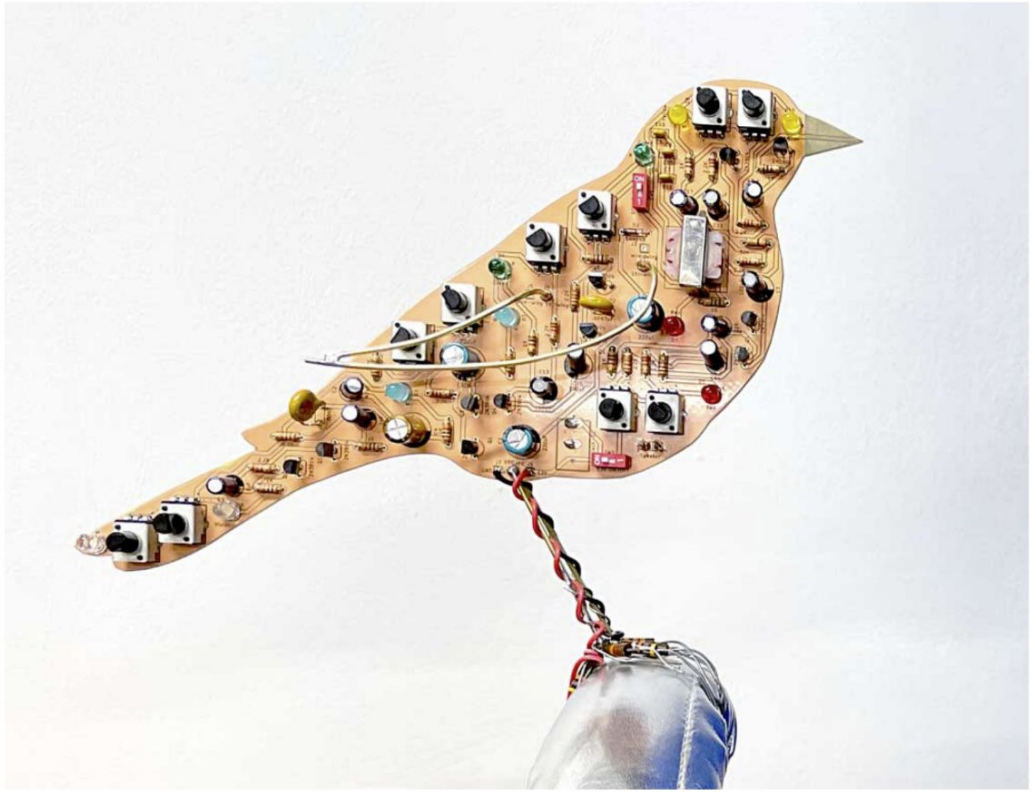
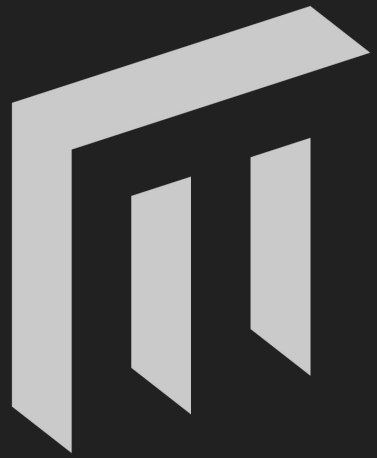


Image caption above: Kelly Heaton, "Printed Circuit Bird (Peach Bird)," 2020. Custom analog electronics and printed circuit board with a clear solder mask, which makes the copper appear peach-colored. 7" x 9" x 1.5"
Image caption below: Kelly Heaton, "Schematic for Deep Fake Birdsong," 2020

Image caption above: Kelly Heaton, "Big Pretty Bird," 2019. Custom analog electronics and printed circuit board with green soldermask, white silkscreen, and ENIG plating. 18" x 24" x 1"
Image caption below: Kelly Heaton, Transparent Bird, 2019. Freeform analog electronics inside of laser cut and folded mylar. 5" x 8" x 3"

Image caption above: Kelly Heaton, "Sounds of Another Time (Rising Dragon)"," 2021. Analog electronics, printed circuit boards, and silkscreen on fabric-covered panel. Unique series of 6 mixed media electronic artworks with one AP. 23.5" x 37.5 x 2"
Image caption below: Kelly Heaton, "The Tree of Life," 2022. 13" x 9" x 1". Artist's proof for an edition not yet released


GHOSTWRITER



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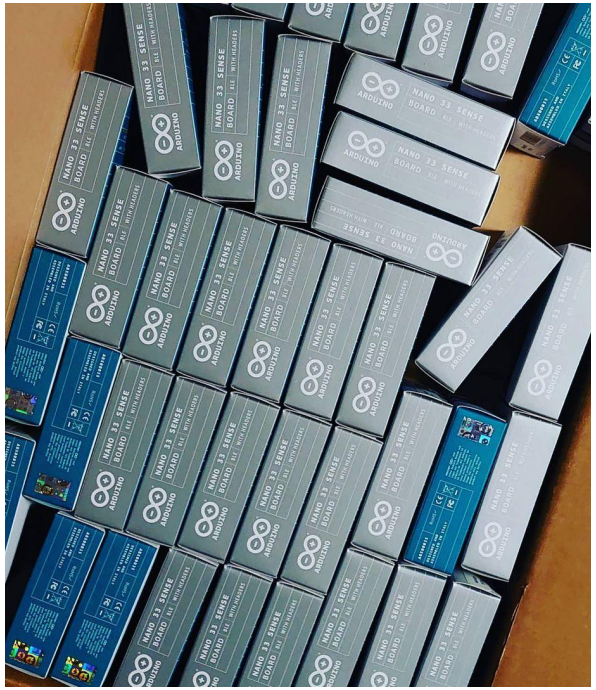
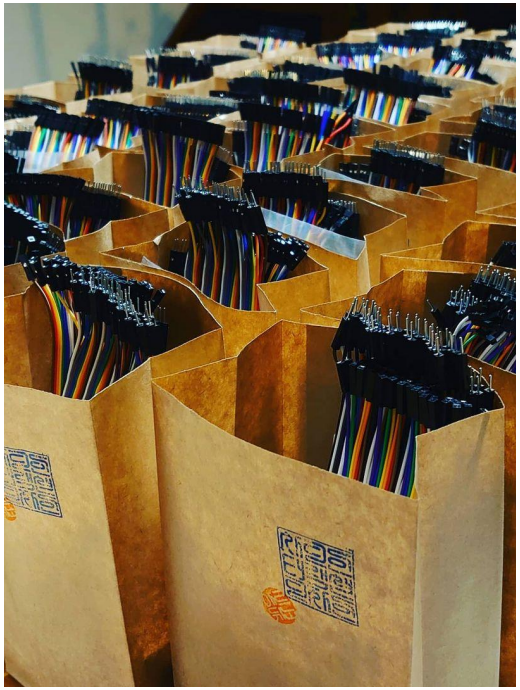
Arduino Uno

connected robots and other educational machines


NANO 33 SENSE
BOARD
ARDUINO



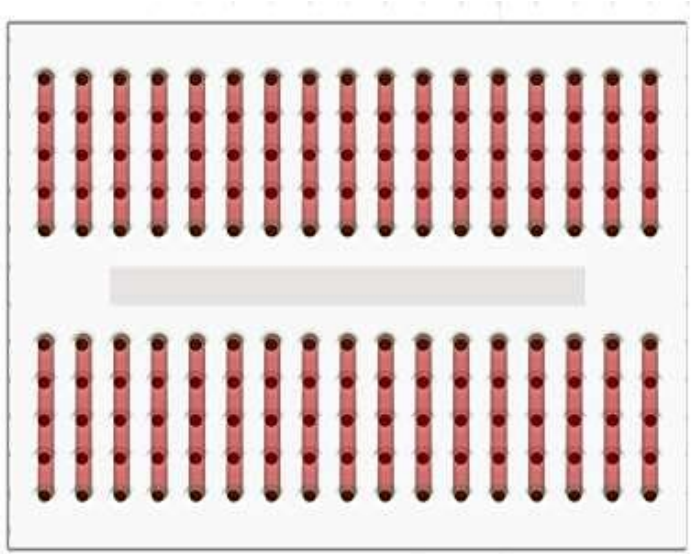

TRUSTED TEACHER - DEALER AT MOLLAN SQUARE
SKÅNEMEJERIER
FIND THE BLUE BIKE!!

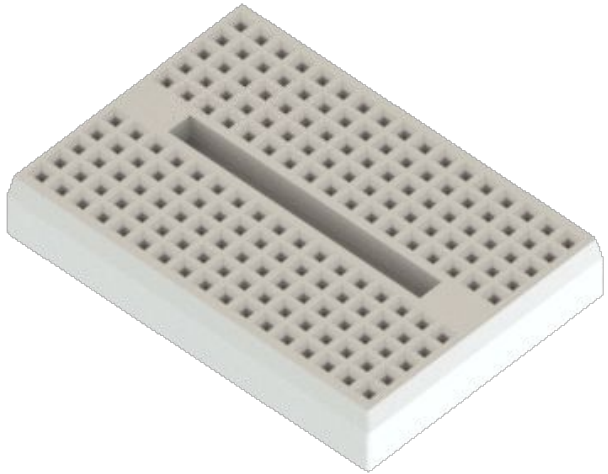
Workshop materials

- micro-servo motor working at 3V3
- green LED
- 2 x push-button or tactile switch
- 1 x joystick
- 1 x piezo buzzer
- USB cable to use between the Arduino board and a PC
- jumper wires
- breadboard
- crafting materials (cardboard, glue, paint, tape, scissors, etc)

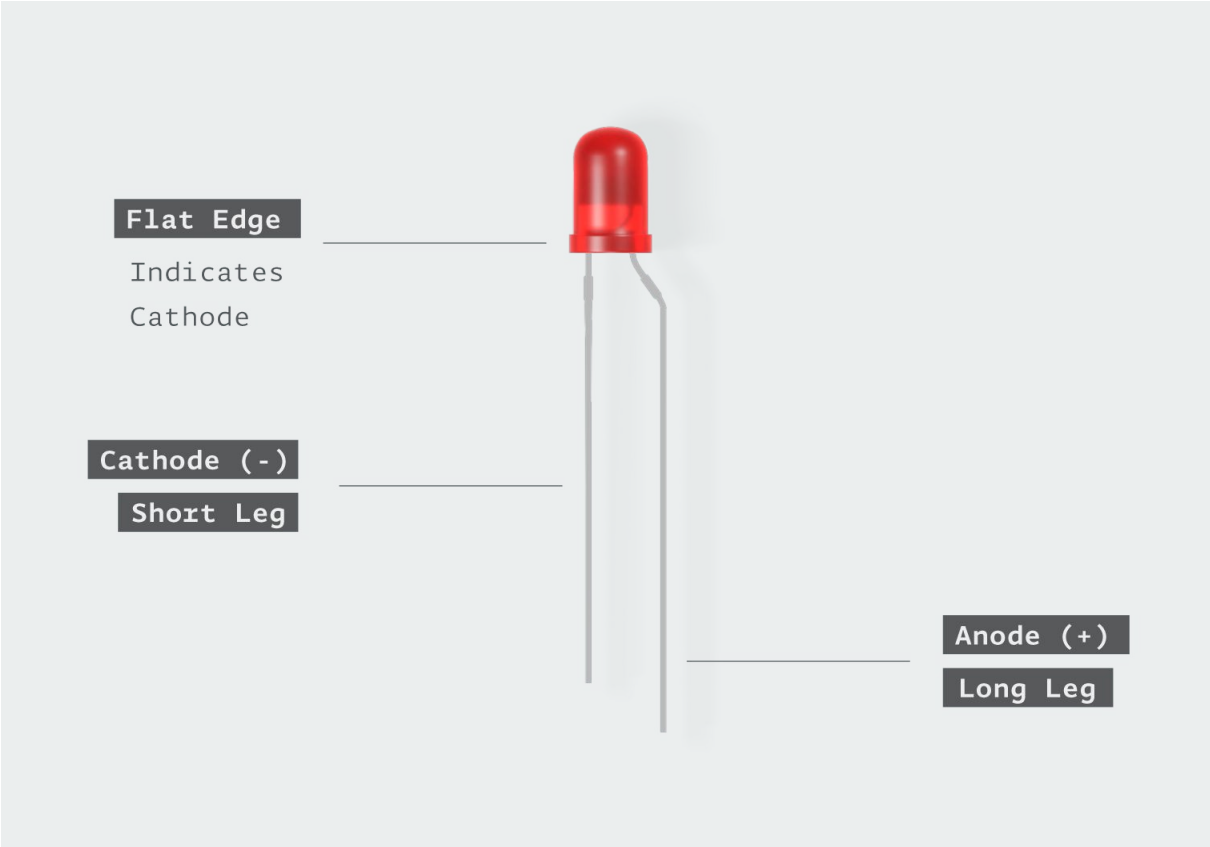

ARDUINO
UNO
ARDUINO
UNO
WE LOVE OPEN-SOURCE

Breadboard

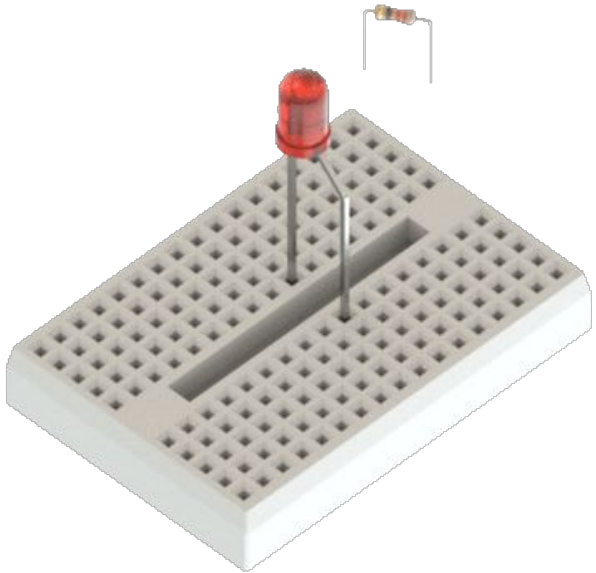




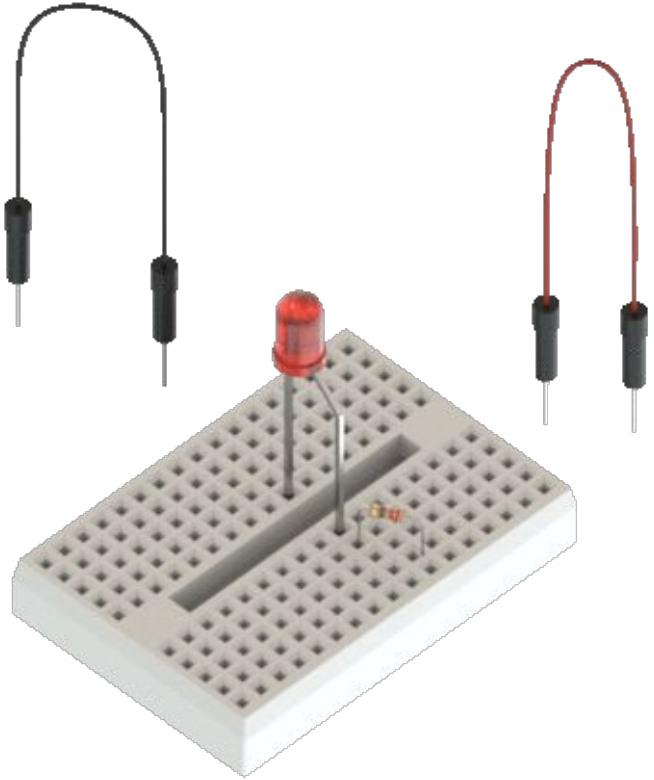
LED (Light Emitting Diode)


Flat Edge
Indicates
Cathode
Cathode (-)
Short Leg
Anode (+)
Long Leg

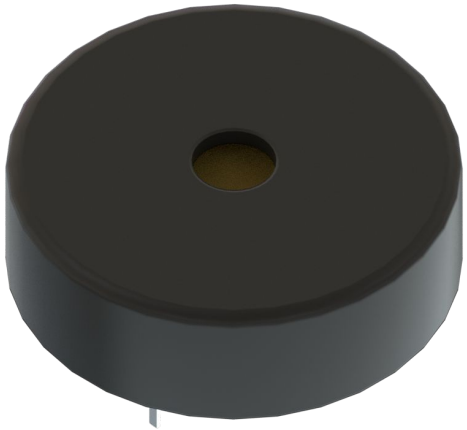
Resistors

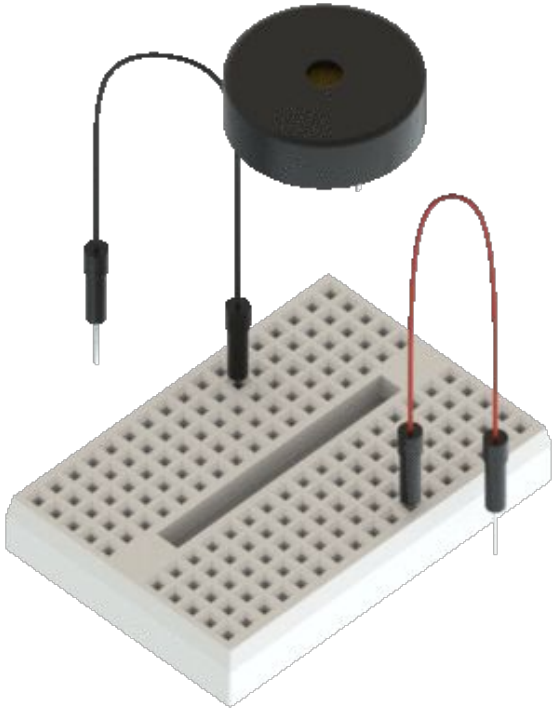


Jumper Wires

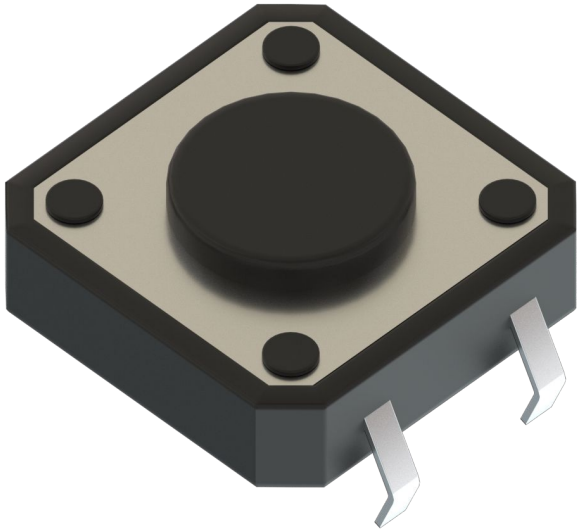


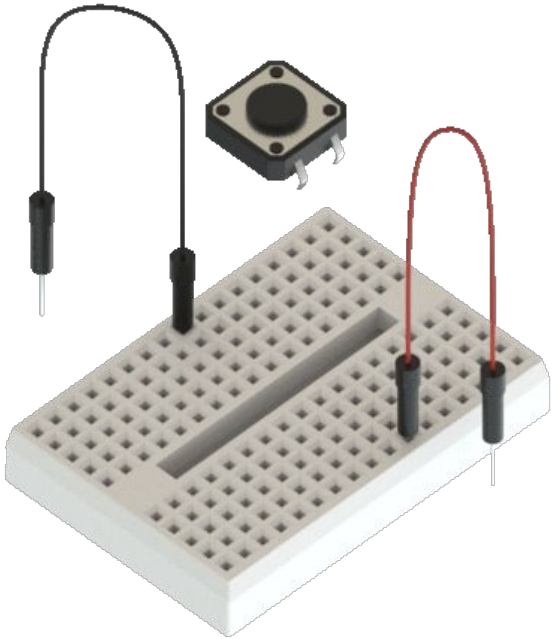
Piezo electric / buzzer



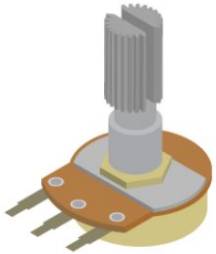


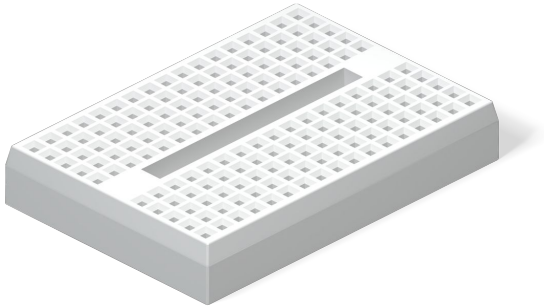
Button

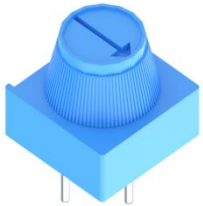


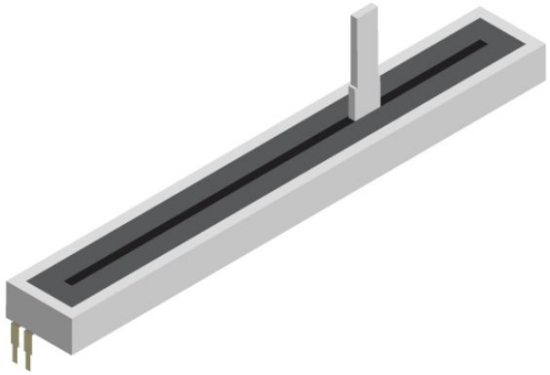


Potentiometers / Joysticks



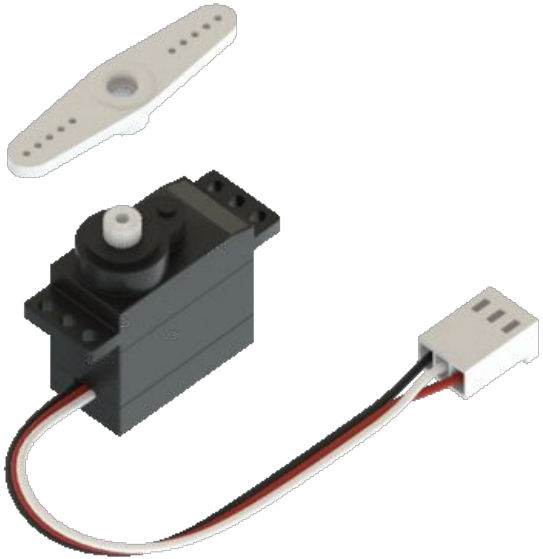




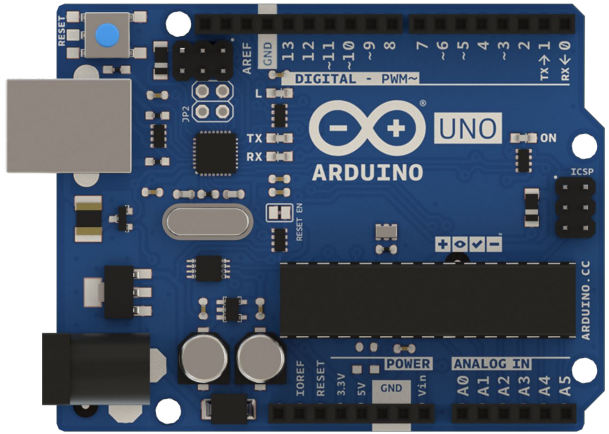


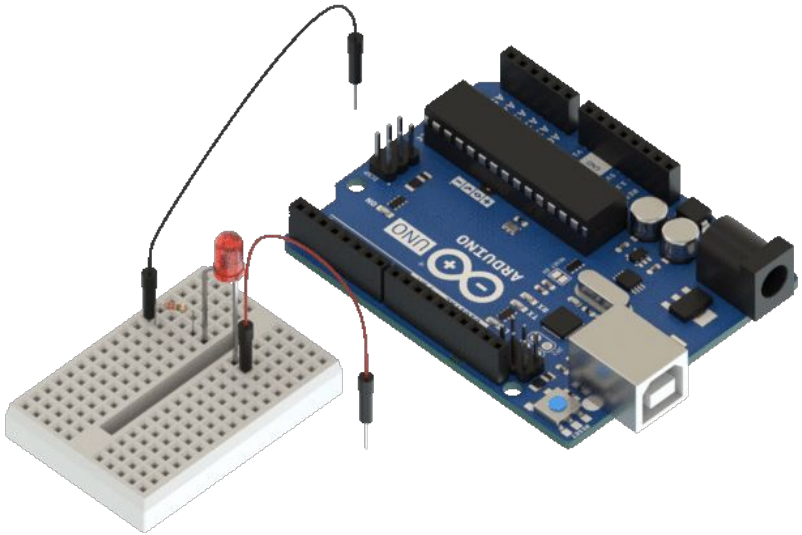
x3

Servo Motor

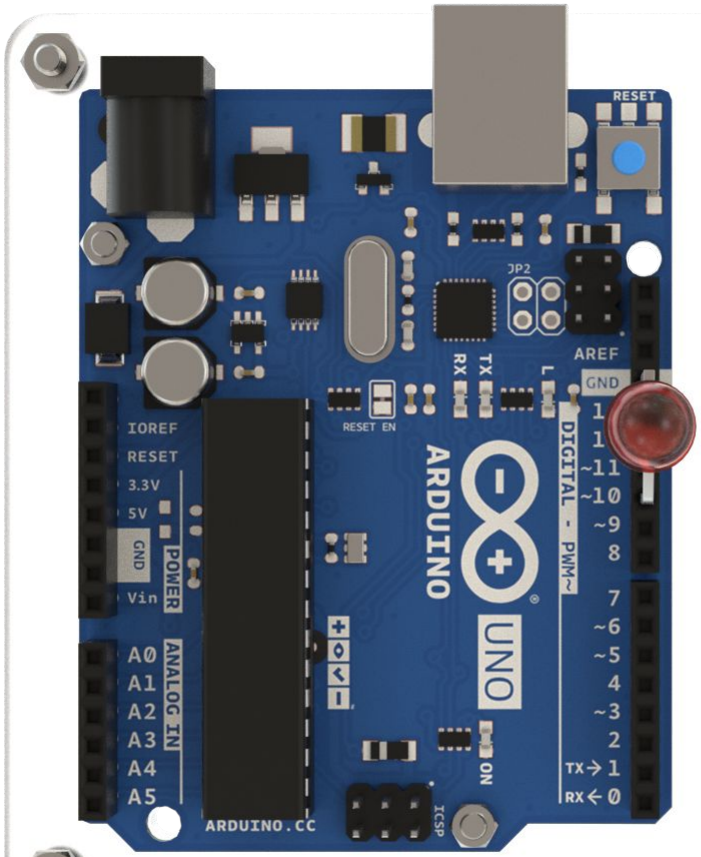


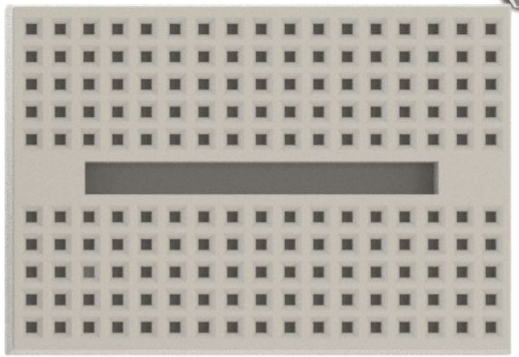
Arduino Board





USB Cable

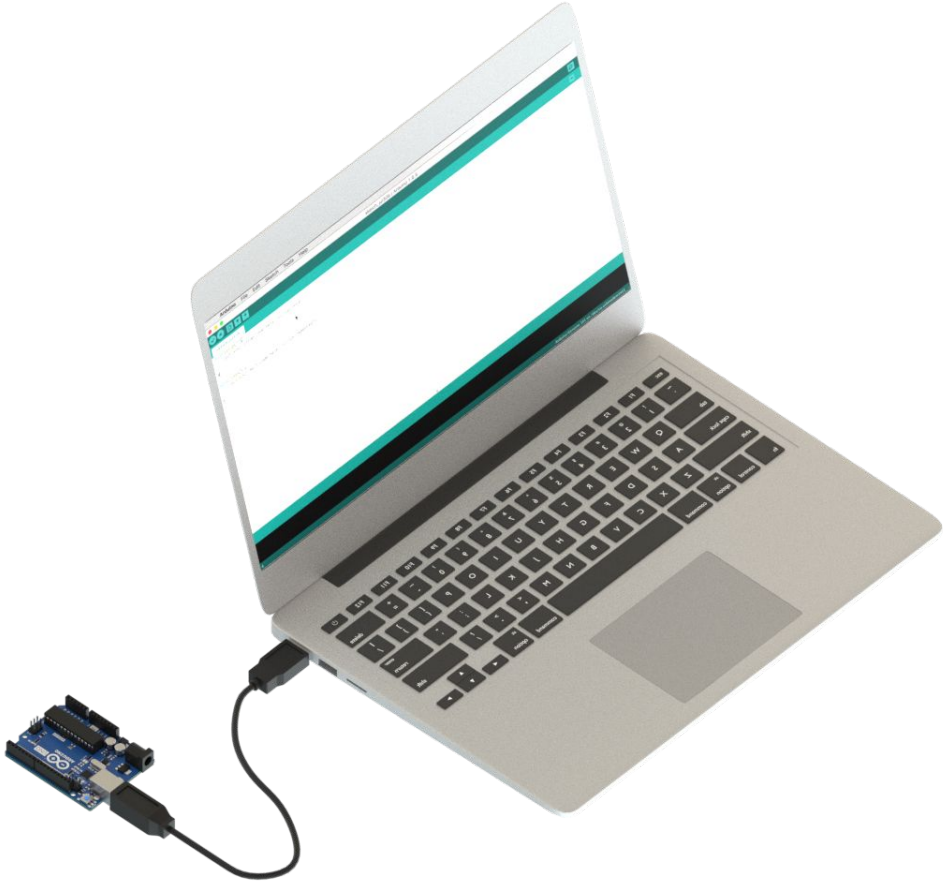




➔ Short pin to GND

➔ Long one to pin 10

- ➔ Connect your board to the PC
- ➔ Open the Arduino IDE



Process

- Install the Arduino IDE 2.x.x
- Install the core for the Arduino Uno R4, which is quite new
- Try the different features of the board
- Connect external parts
- Build a small interactive machine
- [if there is time] Connect to the Arduino Cloud

1. Blink

➔ **Select your board**
Arduino Uno R4

➔ **Selecciona el puerto**
Tools > Port > Arduino Uno

➔ **Abre el ejemplo**
File > Examples > EduIntro > courseware > workshop_1h > Blink

➔ **Descarga el código a tu placa**

1. Blink

RETO

Modifica el programa para que parpadee más rápido / despacio

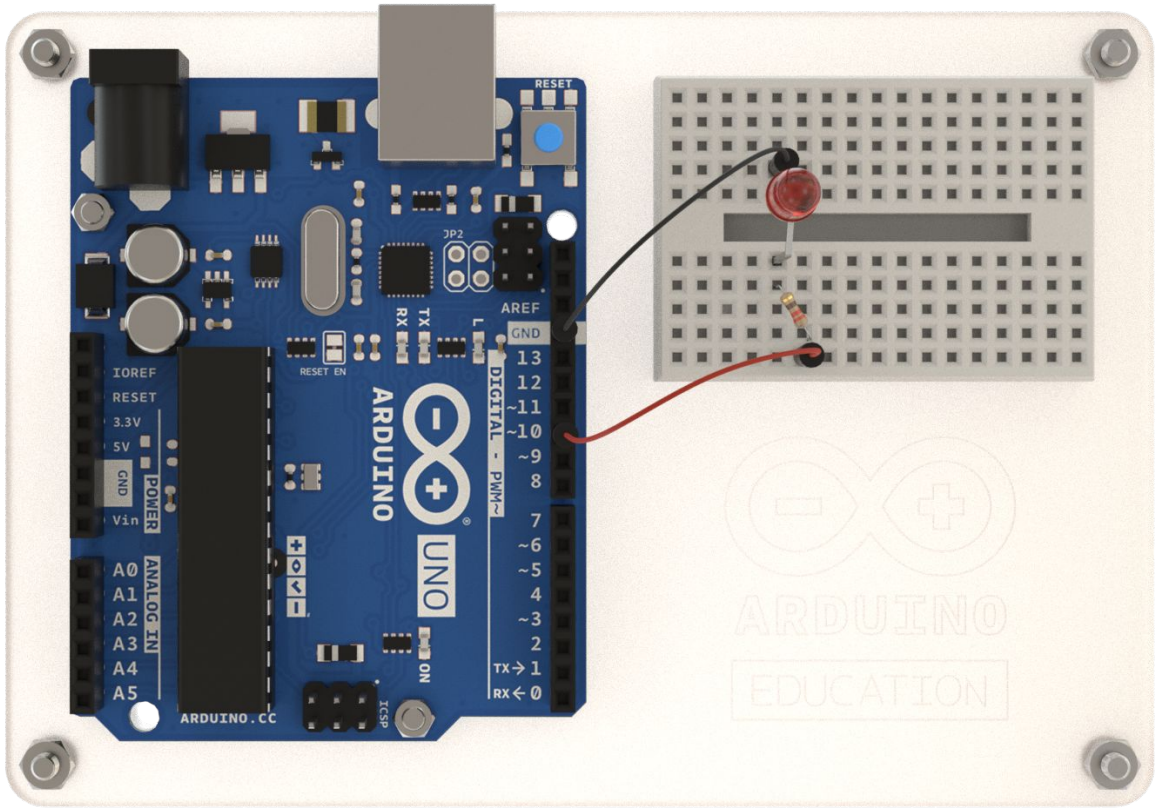
OBJETIVOS

- ➔ Encuentra y selecciona tu placa
- ➔ Abre ejemplos
- ➔ Descarga código a tu placa
- ➔ Modifica un programa
- ➔ Usa un LED

Desconecta la placa del ordenador

1. Blink

- Añadamos un LED externo
- Conectado al pin 10
- Usando una resistencia en serie



1. Blink

RETO

Cambia el LED al pin 5

OBJETIVOS

- ➔ Tu primer circuito conectado a Arduino
- ➔ Use de una breadboard
- ➔ Uso de resistencias
- ➔ Uso de más pines en la placa

Desconecta la placa del ordenador

2. Hola Mundo!

- ➔ Saluda a tu motor!
- ➔ Prepara tu motor con uno de los apliques para que puedas ver como se mueve

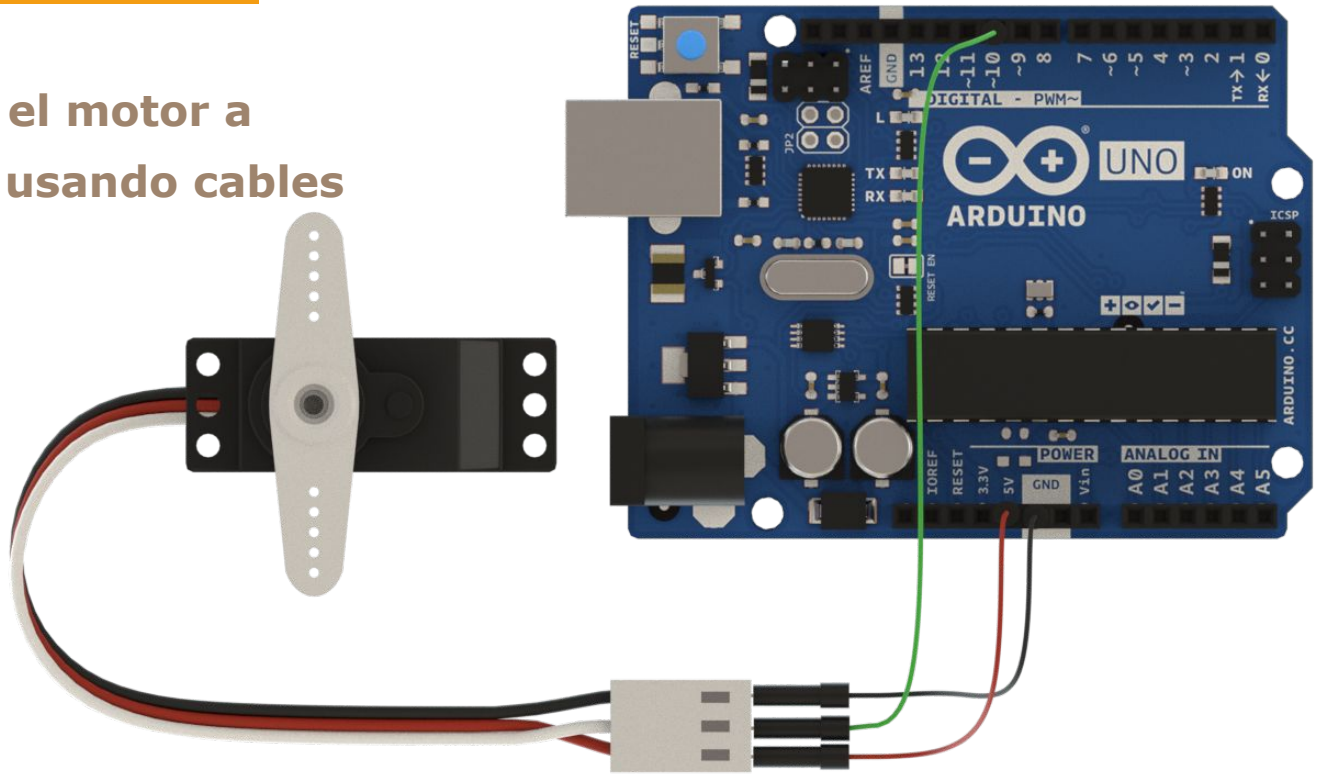
2. Hola Mundo!

➔ **Conecta el motor a Arduino usando cables**

Rojo > 5V

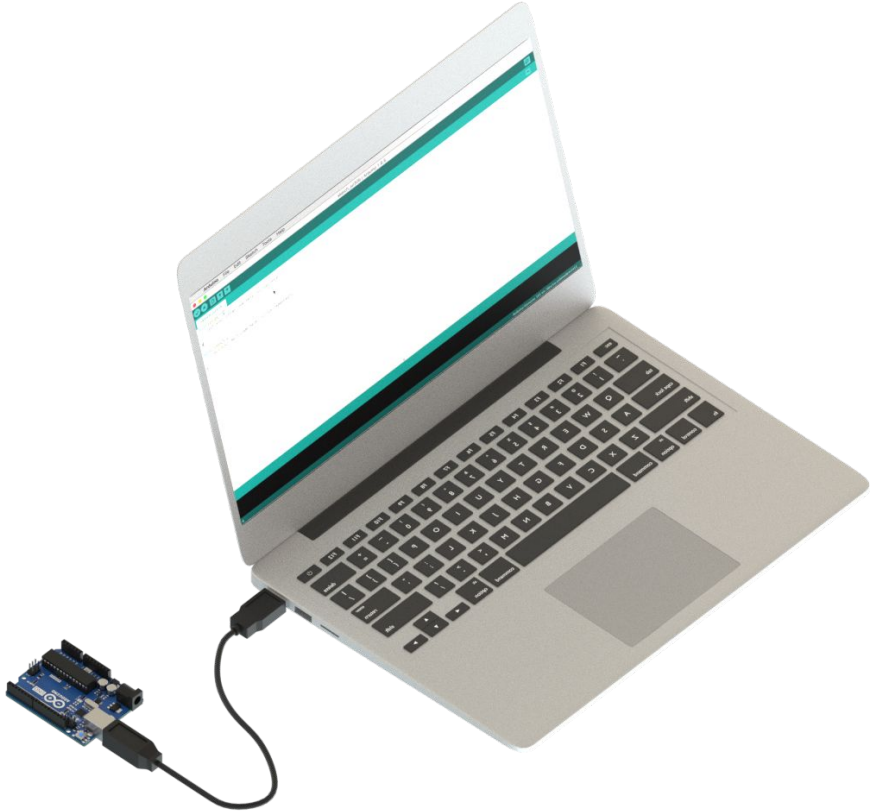
Negro > GND

Blanco > 10



2. Hola Mundo!

- ➔ Conecta la placa al ordenador
- ➔ Comprueba que placa y puerto estén bien seleccionados
- ➔ **Abre el ejemplo**
  File > Examples > EduIntro > courseware > workshop_1h > Servo



2. Hola Mundo!

RETO

Cuales son los mayores / menores valores que puedes usar para posicionar el motor?

OBJETIVOS

- ➔ Conecta un servo motor
- ➔ Programa un motor para que se mueva
- ➔ Combinando 3 de estos, podrías hacer un brazo robótico!

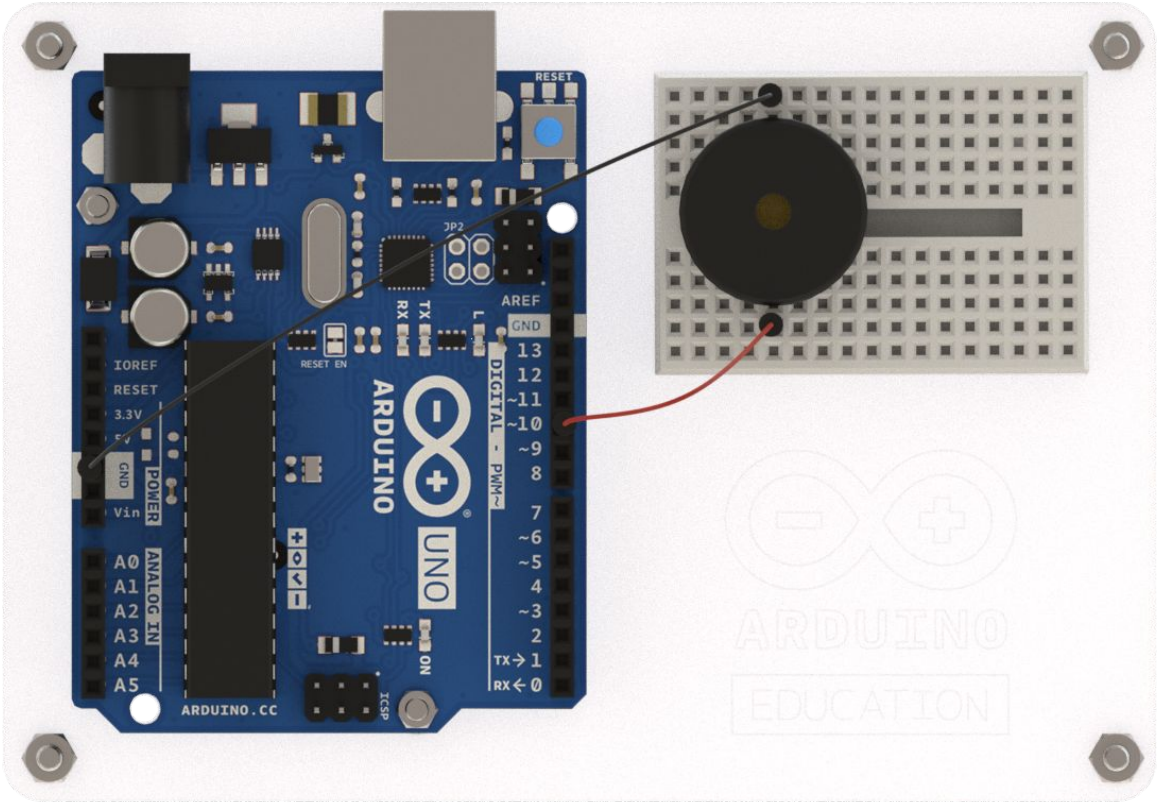
Desconecta la placa del ordenador

3. Melodía

➔ **Conecta el piezo a tu placa**

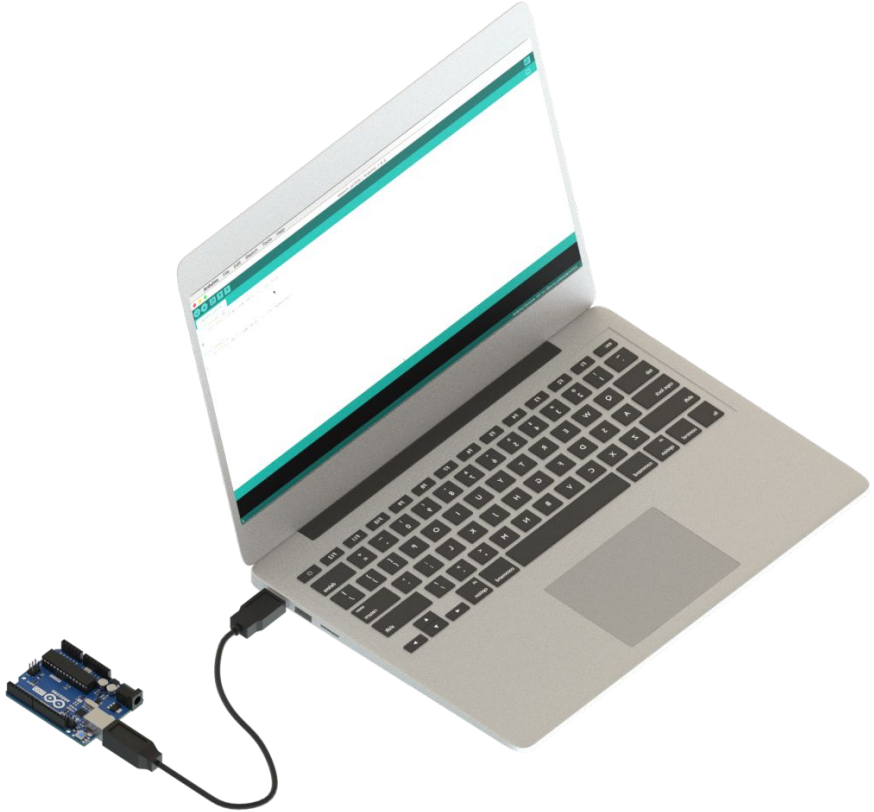
Rojo > 10

Negro > GND



3. Melodía

- ➔ Conecta la placa al ordenador
- ➔ Comprueba que placa y puerto estén bien seleccionados
- ➔ **Abre el ejemplo**
  File > Examples > EduIntro > courseware > workshop_1h > Melody



3. Melodía

RETO

Modifica tu canción

OBJETIVOS

- ➔ Música!
- ➔ Piezo y melodías
- ➔ Colabora con otros y crea una orquesta!

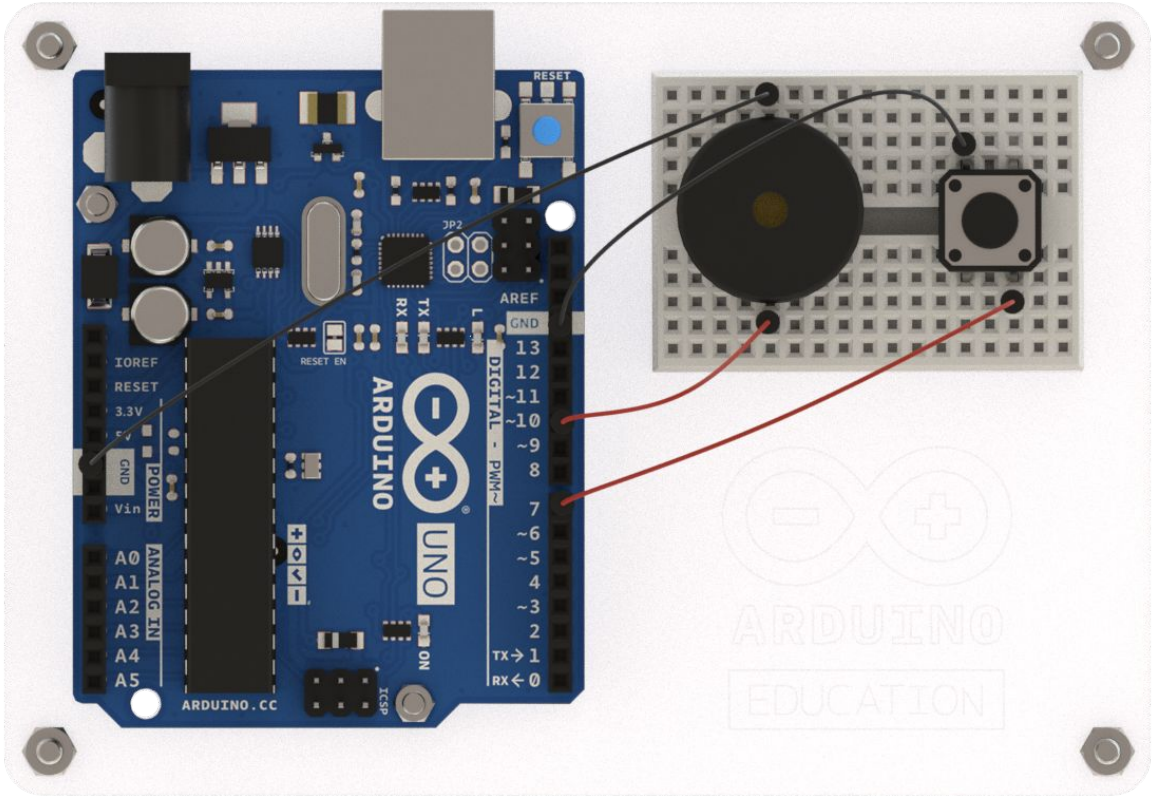
Desconecta la placa del ordenador

4. Timbre

➔ **Añade un botón a tu circuito**

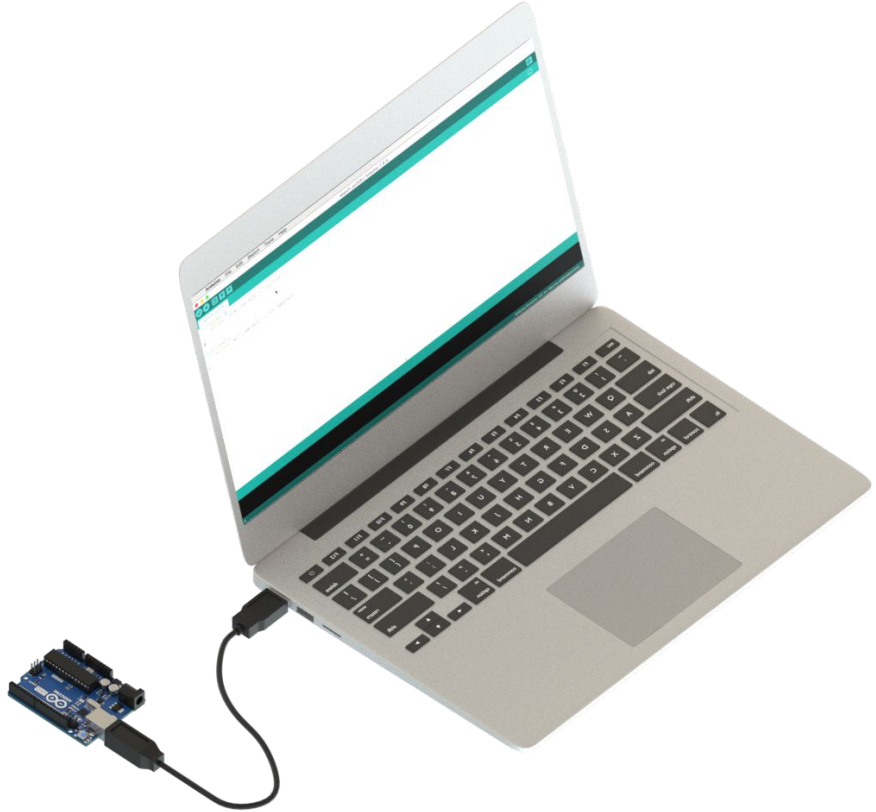
Rojo > 7

Negro > GND



4. Timbre

- Conecta la placa a tu ordenador
- Comprueba que placa y puerto estén bien seleccionados
- **Abre el ejemplo**
  File > Examples > EduIntro > courseware > workshop_1h > MelodyButton



4. Timbre

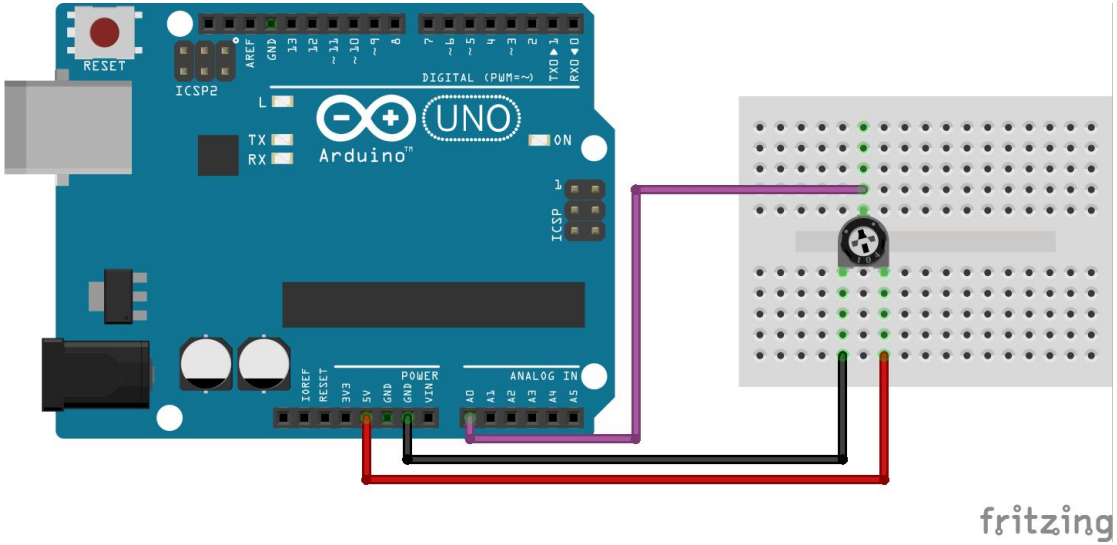
OBJETIVOS

- ➔ Música!
- ➔ Piezo y melodías
- ➔ Uso de sensores

Desconecta la placa del ordenador

5. Señales analógicas

➔ **Conecta el potenciómetro a tu placa**



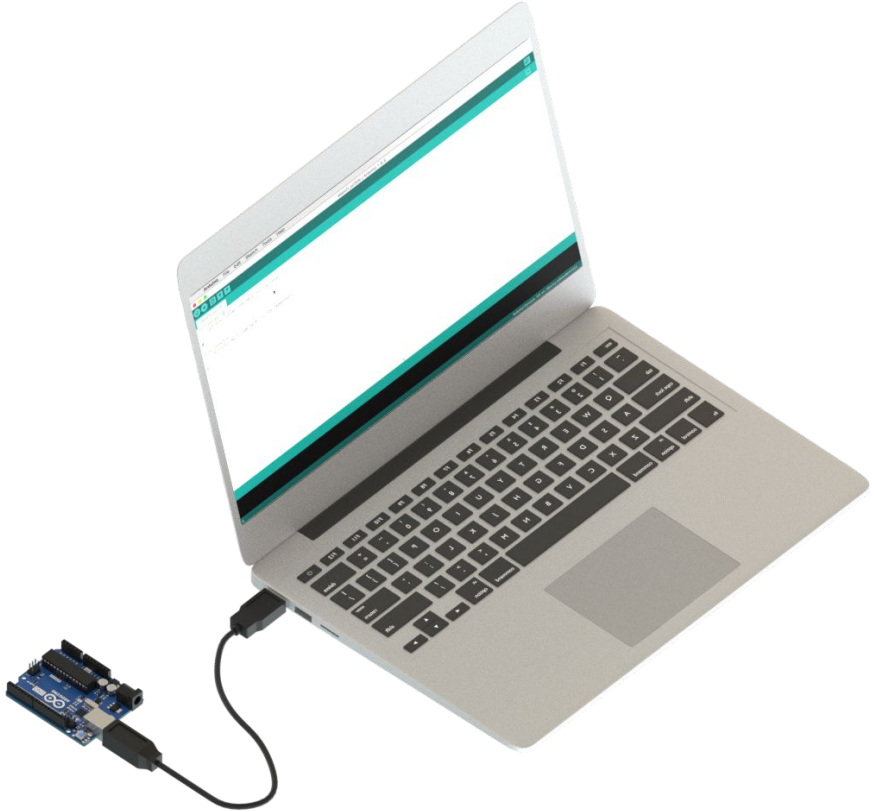
Rojo > 5V (3V3)

Negro > GND

Otro > Señal

5. Señales analógicas

- ➔ Conecta la placa al ordenador
- ➔ Comprueba que placa y puerto estén bien seleccionados
- ➔ **Abre el ejemplo**
  File > Examples > EduIntro > courseware > by_topic > Potentiometer



5. Señales analógicas

RETO

Prueba la función readStep(int steps) y explica como funciona.
Conecta el LED a la placa para ver como cambia la intensidad.

OBJETIVOS

- ➔ Lee señales analógicas
- ➔ Conoce diferentes tipos de sensores analógicos
- ➔ Manda valores por el puerto serie

Desconecta la placa del ordenador