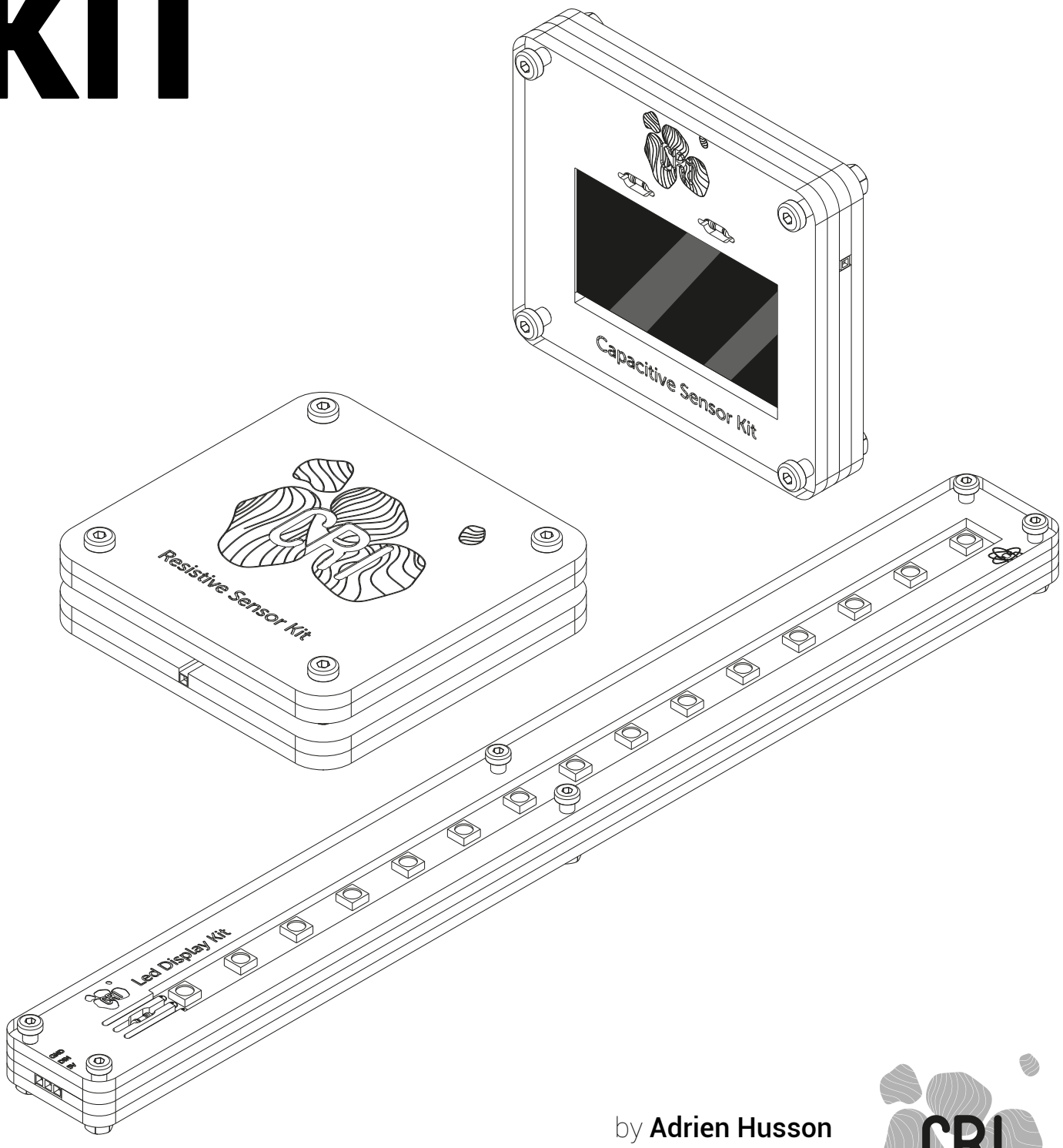
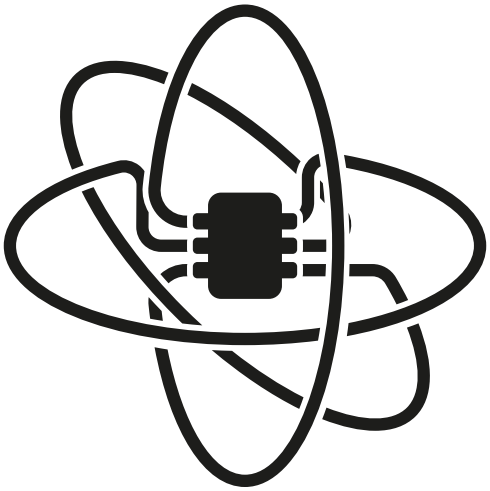
HOW TO BUILD

SENSORS KIT



by **Adrien Husson**
for the CRI



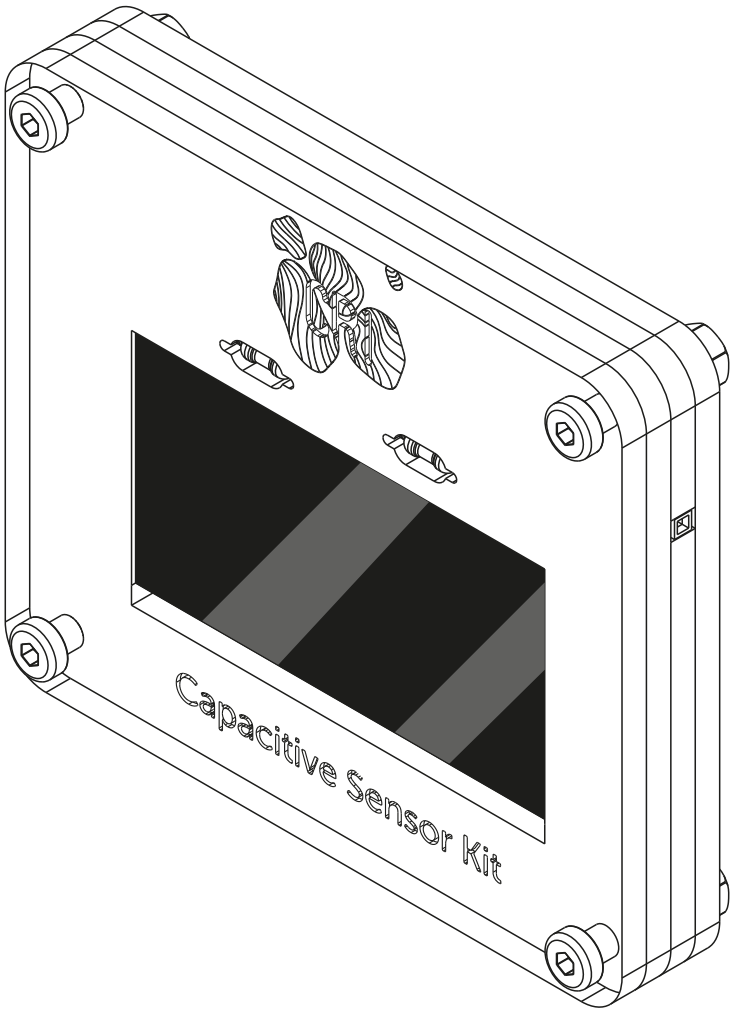
This manual refers to the **RGB Lamp Demonstrator** project
and is part of the **Movuino** documentation.

Project presentation:

http://www.movuino.com/index.php/portfolio/balance-board/

All files of the project can be found on:

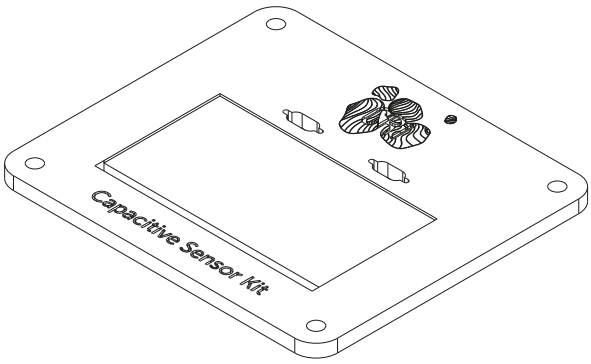
https://github.com/hssnadr/BalanceBoard



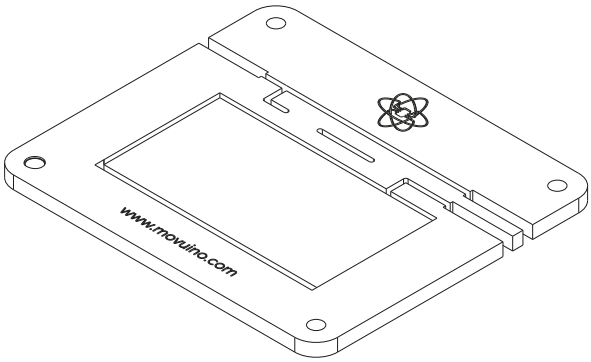
CAPACITIVE SENSOR

TO LASER CUT

- **Plywood** — **3mm thick**



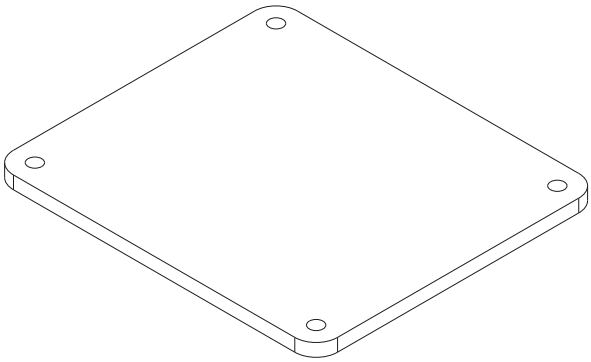
A1 ***x1*** **Front panel**



A2 ***x1*** **Back panel**

BalanceBoard/01_MakingRessources/BalanceBoard_6mm.svg

- **Plexyglass** — **3mm thick**

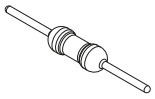


B ***x2*** **Plexyglass case**

BalanceBoard/01_MakingRessources/BalanceBoard_3mm.svg

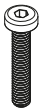
TO BUY

C1 ***x1*** Copper tape



C2 ***x2*** 10kOhm resistors (R_{cap})

C3 ***x2*** Female to female Dupont wires



C4 ***x4*** M3 16mm CHC screws

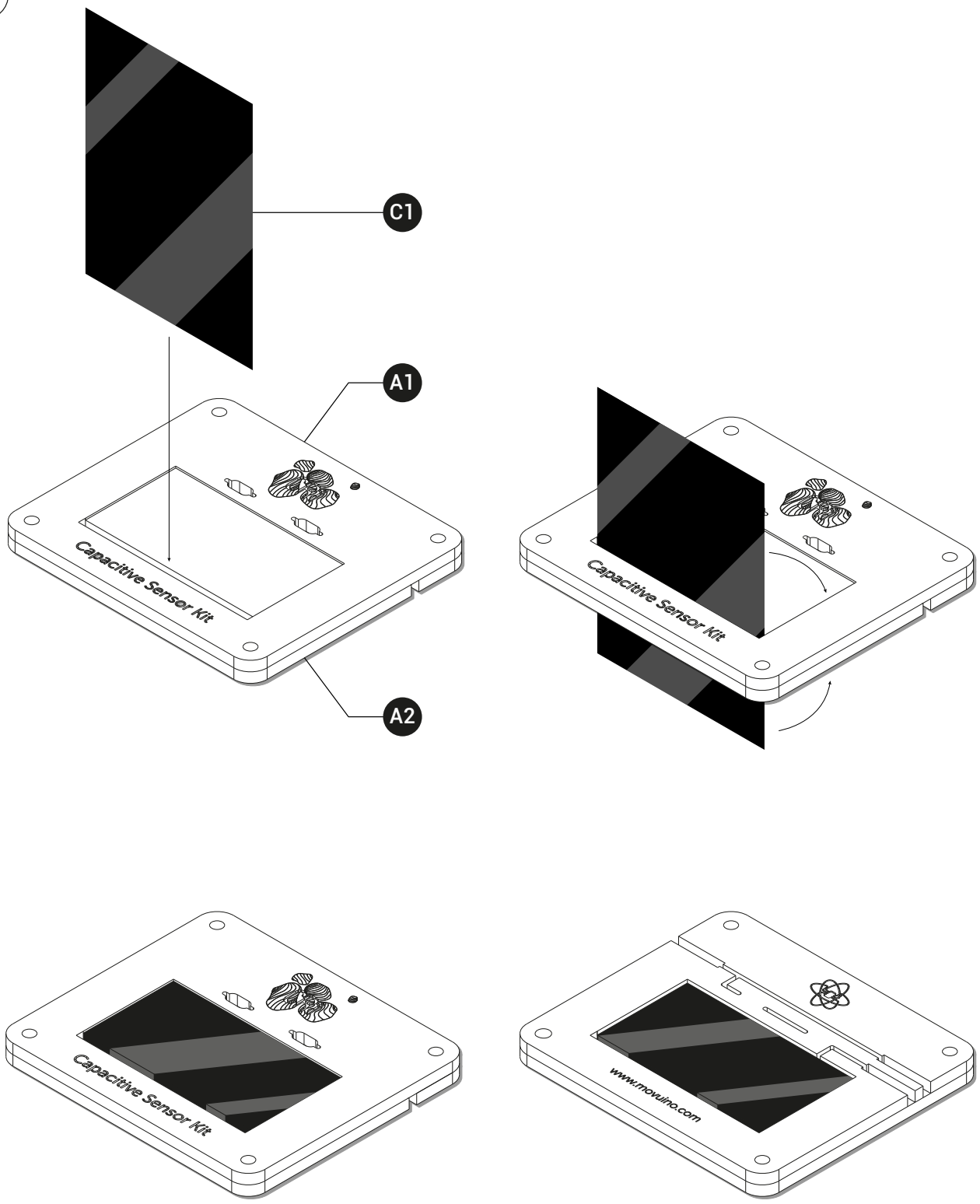
C5 ***x4*** M3 Serrated washers

C6 ***x4*** M3 Nuts

ASSEMBLY

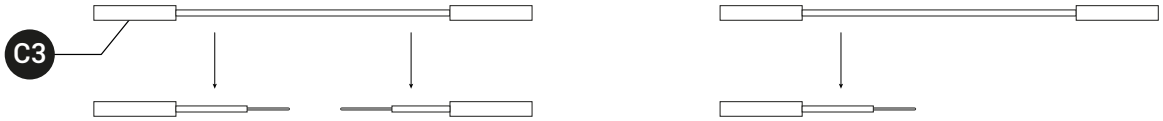
CAPACITIVE SENSOR

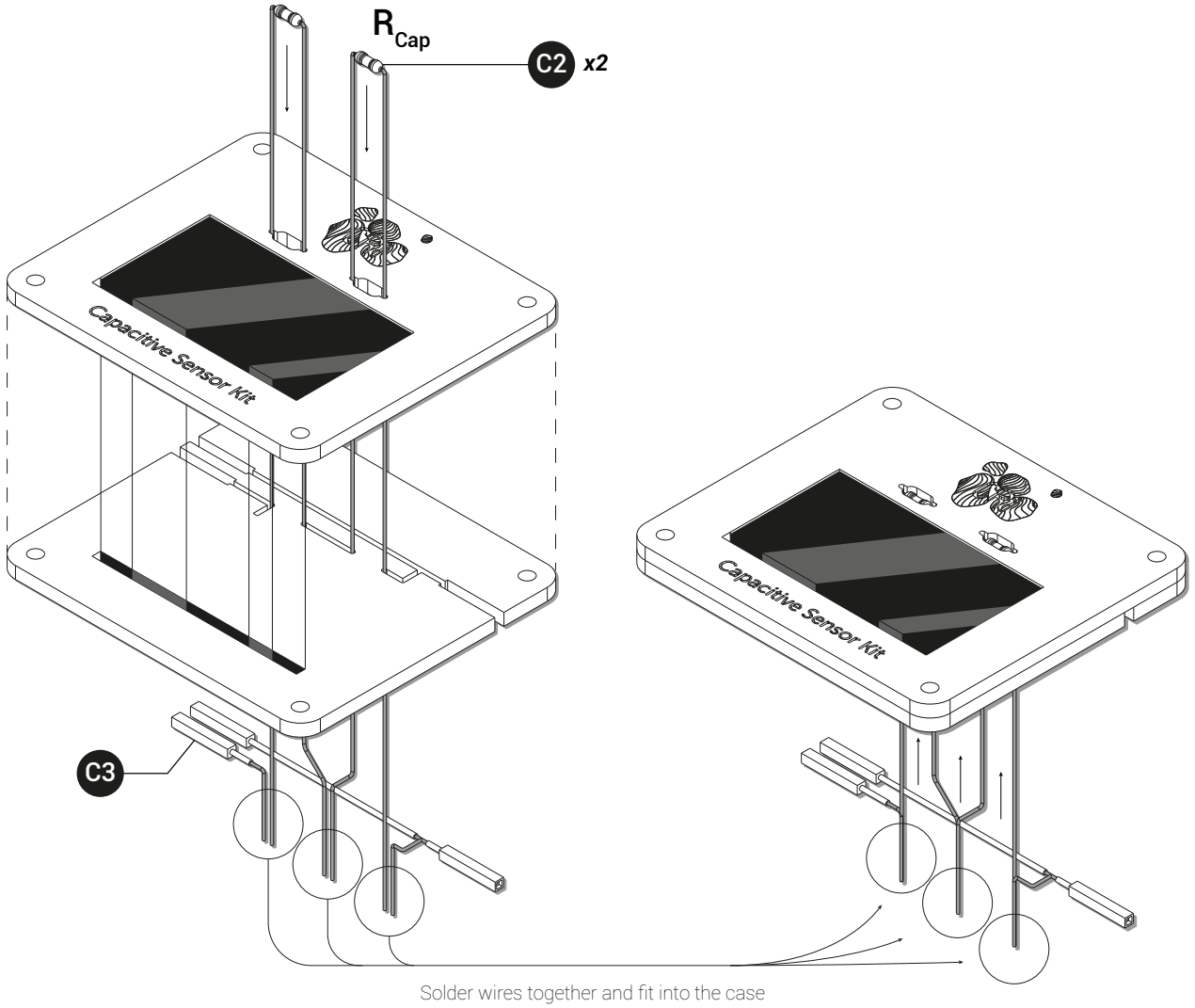
1



3

Cut the wires insulation to get the inner cables

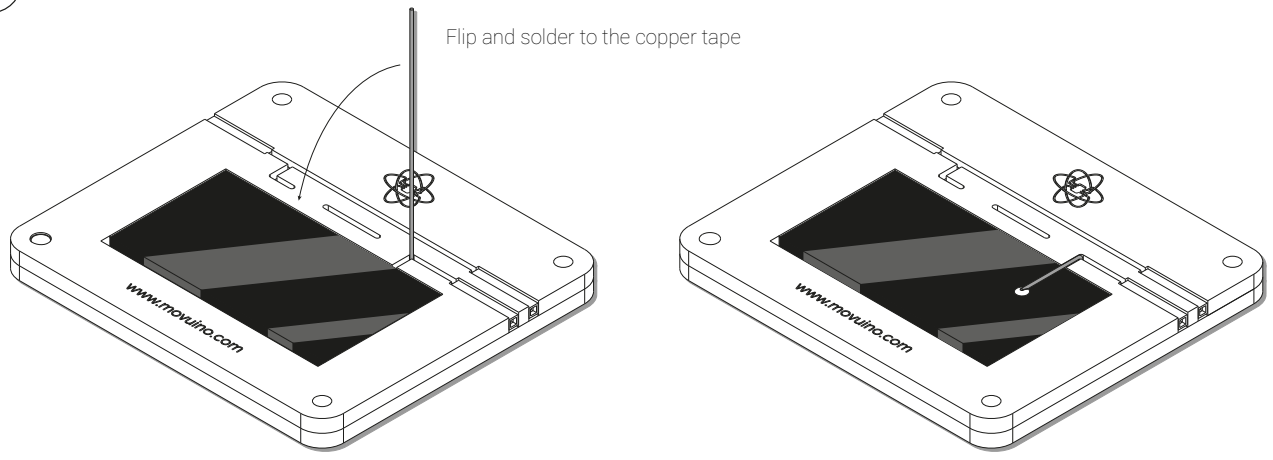




Solder wires together and fit into the case

3

Flip and solder to the copper tape



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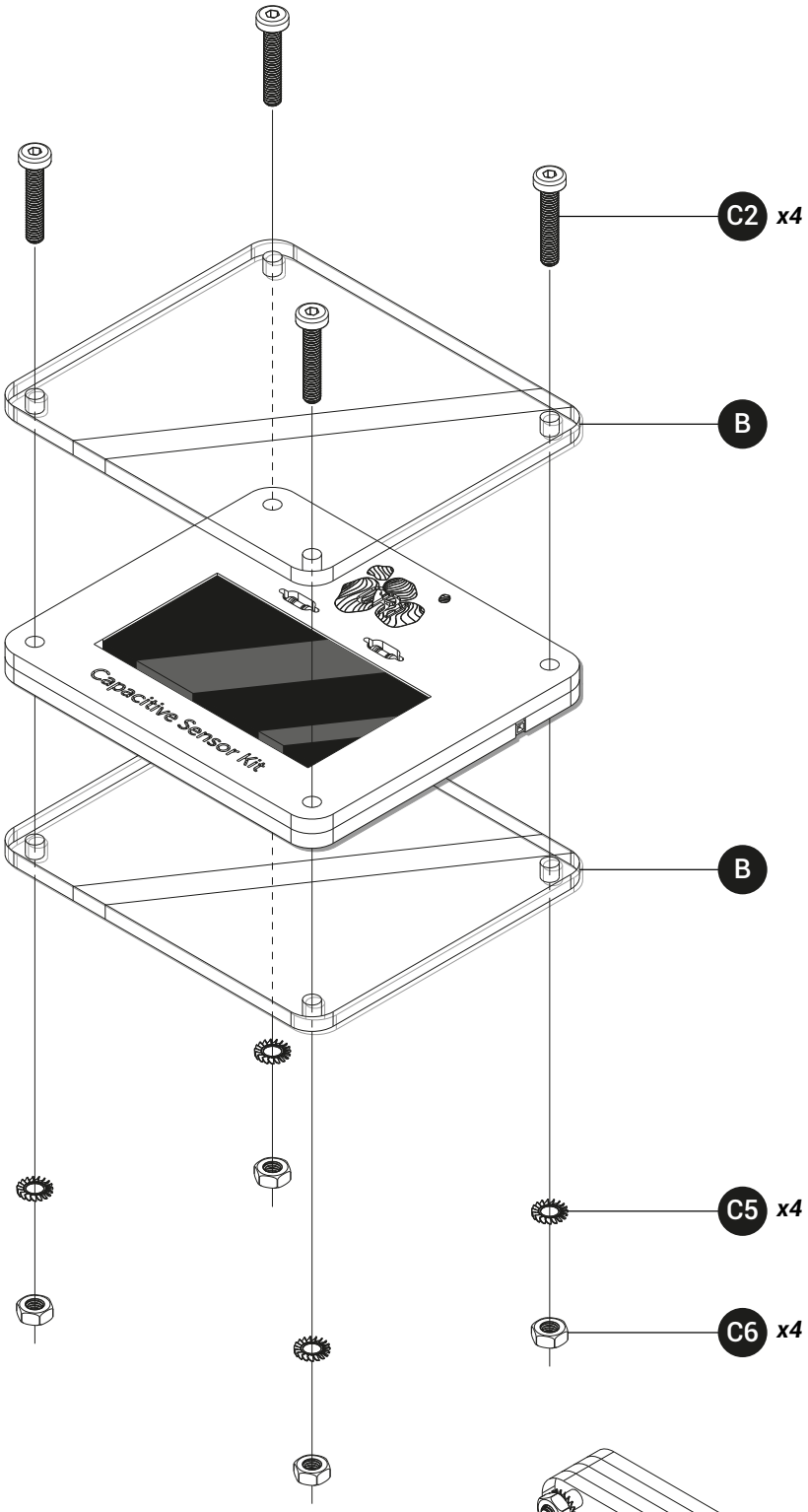
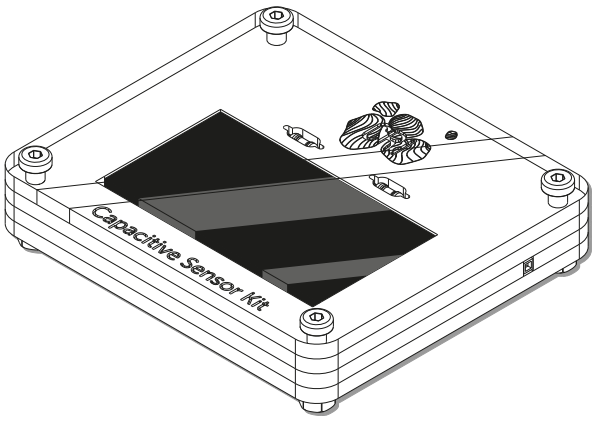
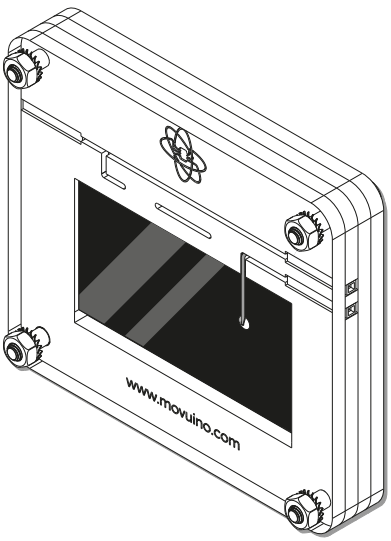
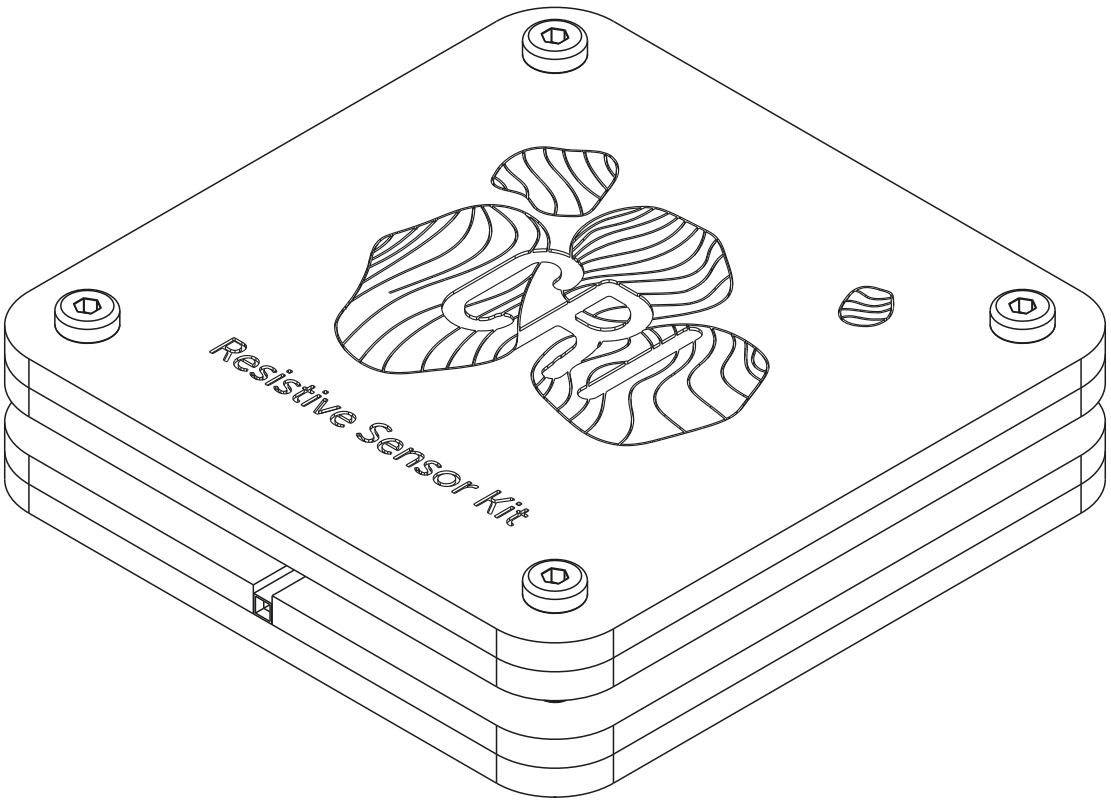

C2 x4
B
Capacitive Sensor Kit
B
C5 x4
C6 x4


Capacitive Sensor Kit

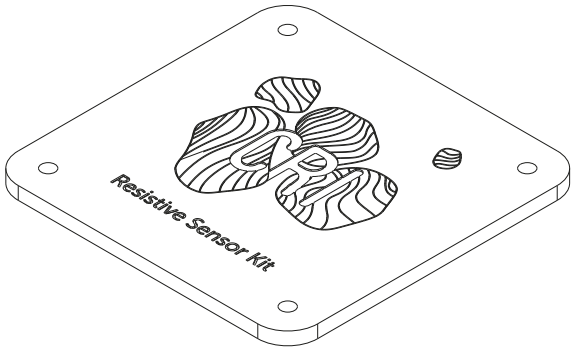

www.movuino.com



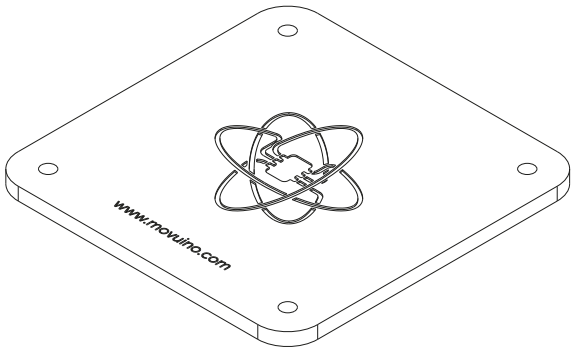
RESISTIVE SENSOR

TO LASER CUT

- **Plywood** — **3mm thick**



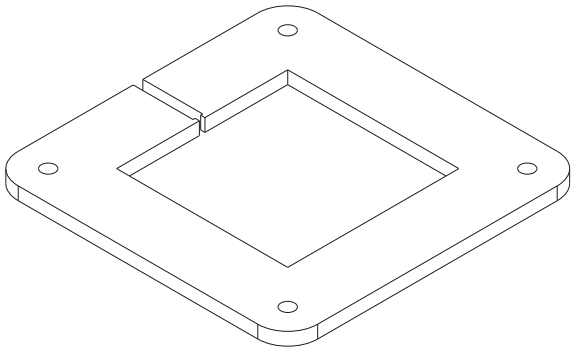
A1 ***x1*** **Front panel**



A2 ***x1*** **Back panel**

BalanceBoard/01_MakingRessources/BalanceBoard_6mm.svg

- **Plexyglass** — **3mm thick**

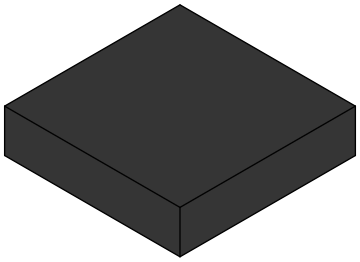


B ***x2*** **Plexyglass case**

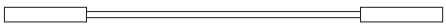
BalanceBoard/01_MakingRessources/BalanceBoard_3mm.svg

TO BUY

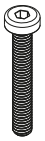
C1 *x2* Copper tape



C2 *x1* Conductive foam



C3 *x1* Female to female Dupont wire



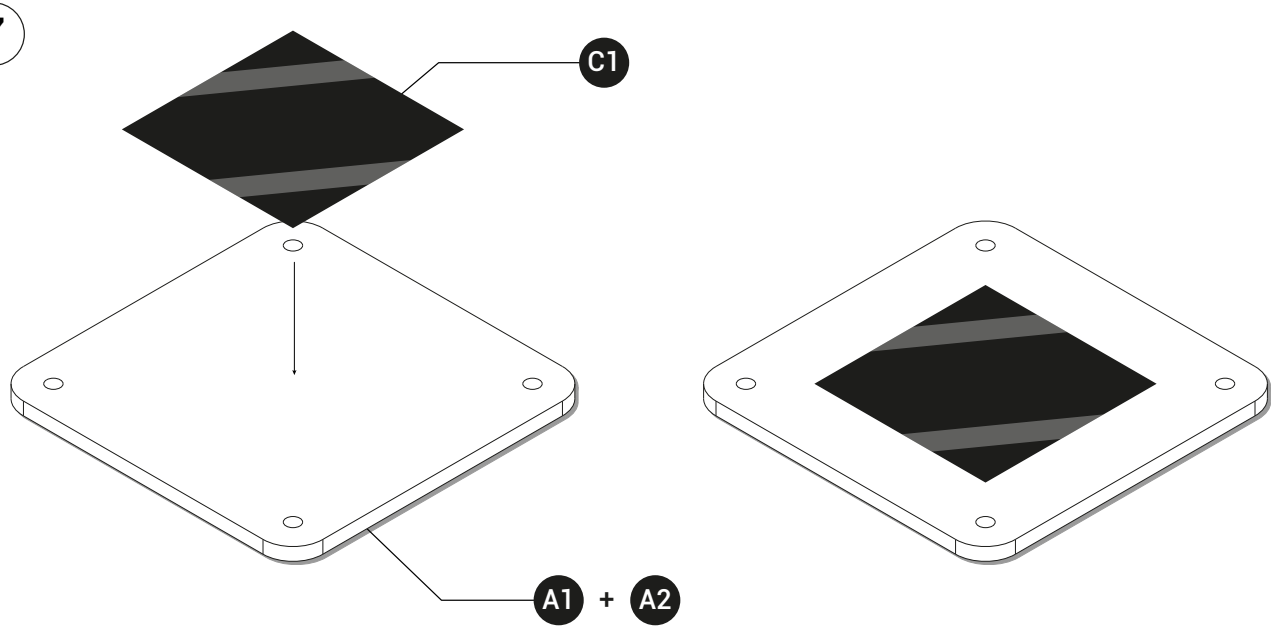
C4 *x4* M3 20mm CHC screws

C5 *x4* M3 Locknuts

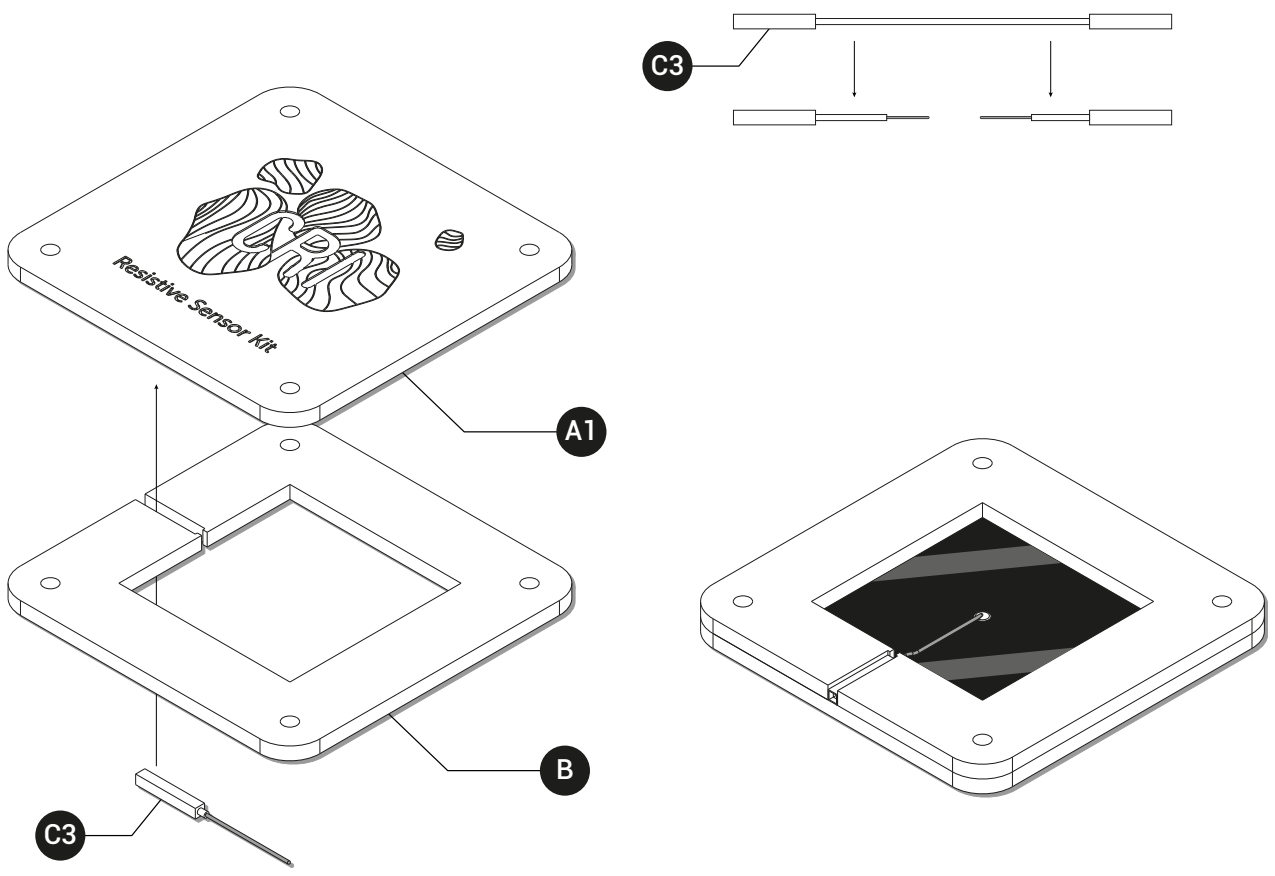
ASSEMBLY

RESISTIVE SENSOR

7



3



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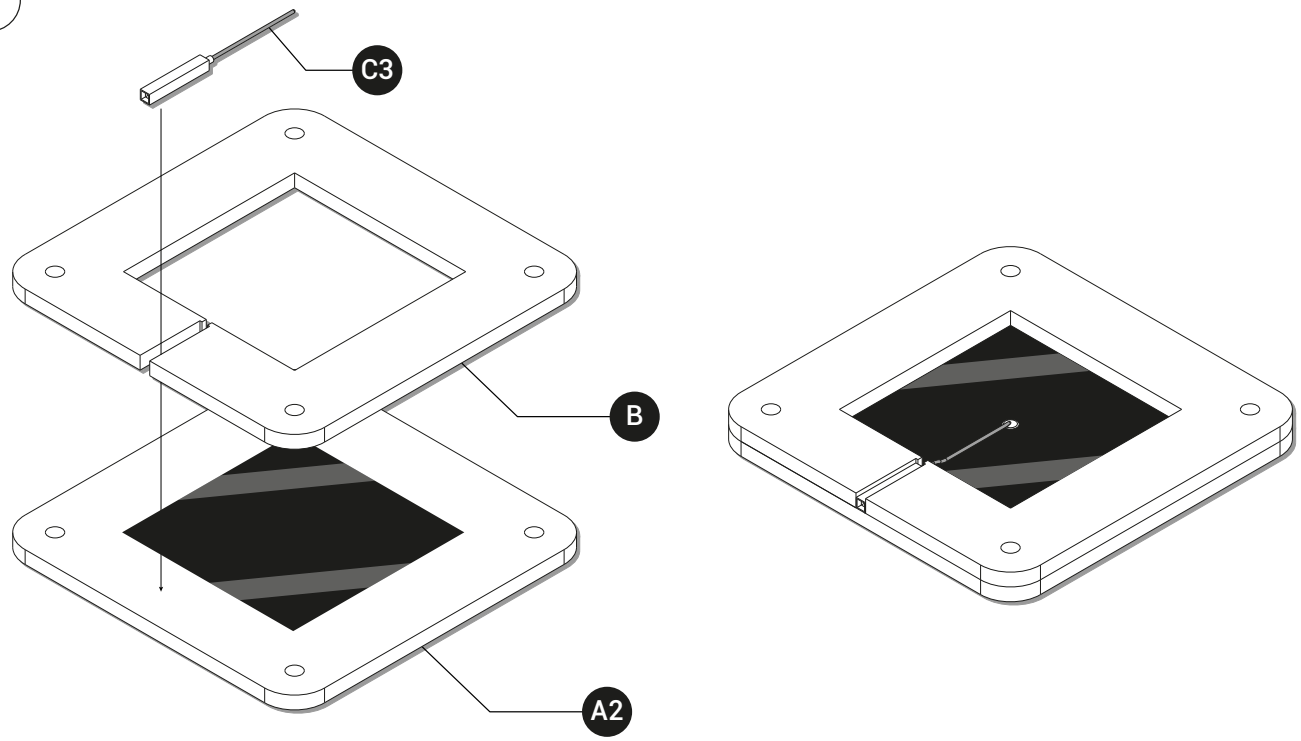

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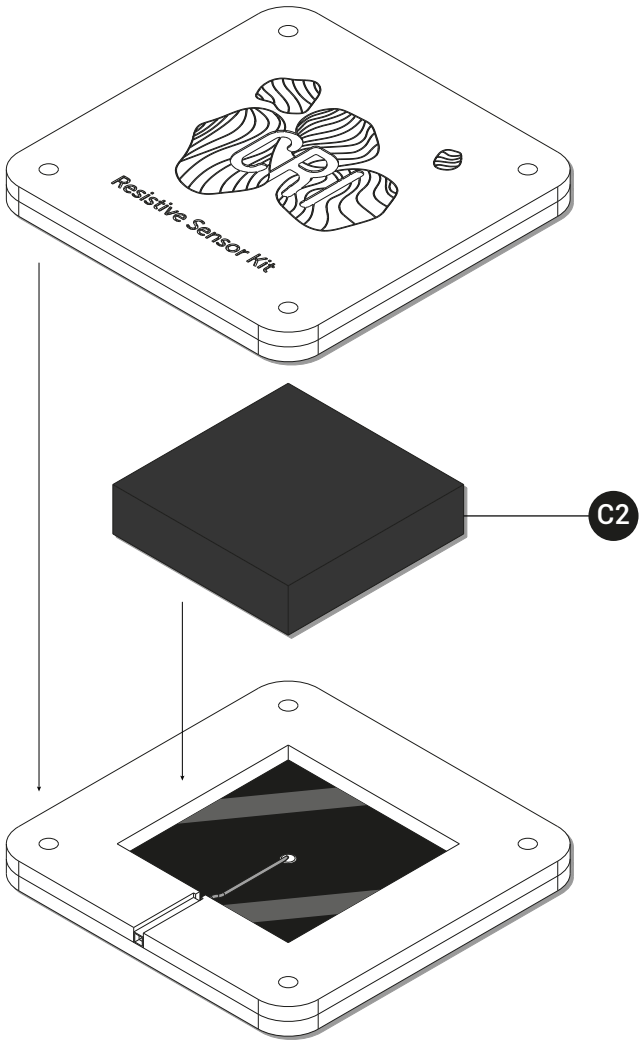

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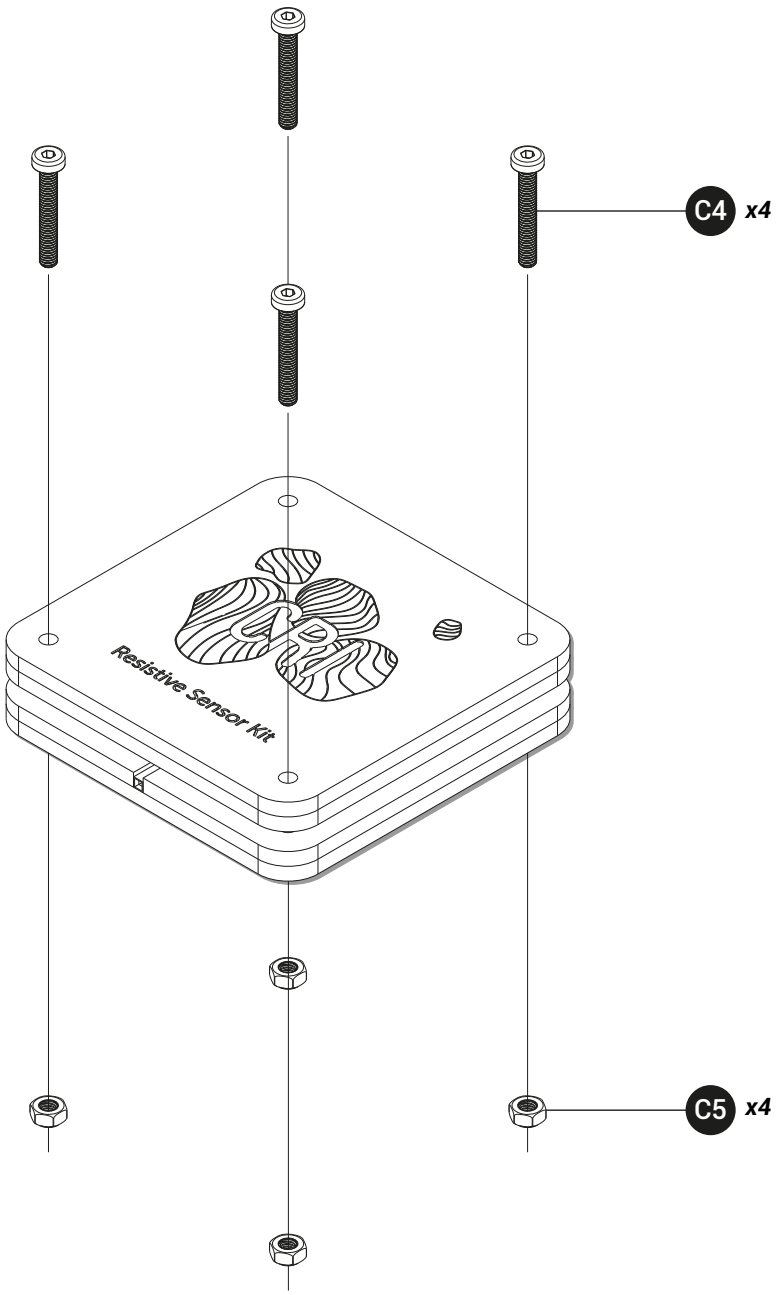
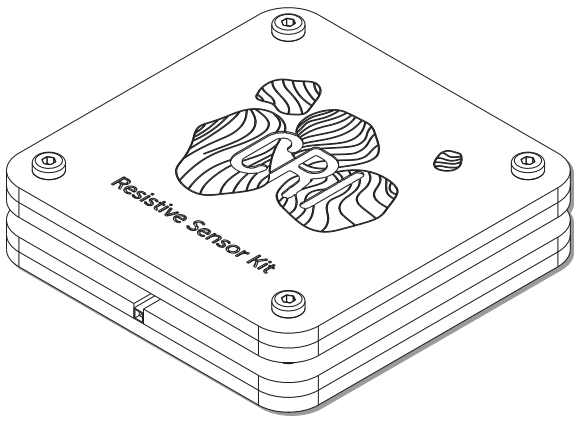
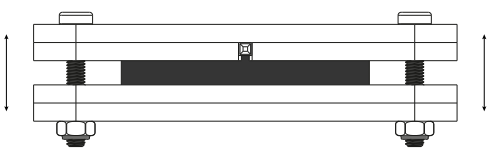
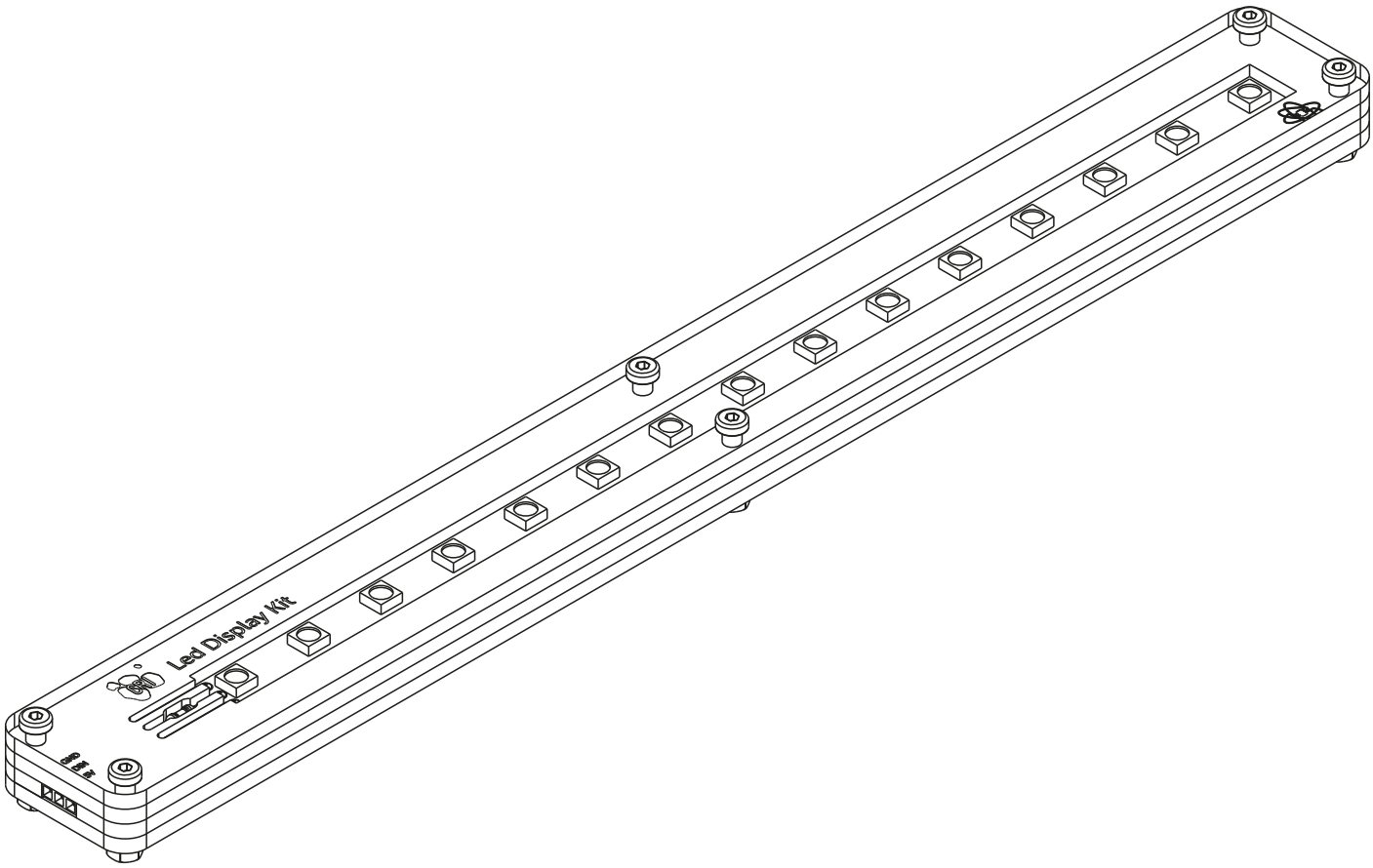




Just screw the minimum to keep the system in place.
The conductive foam should act as a spring.

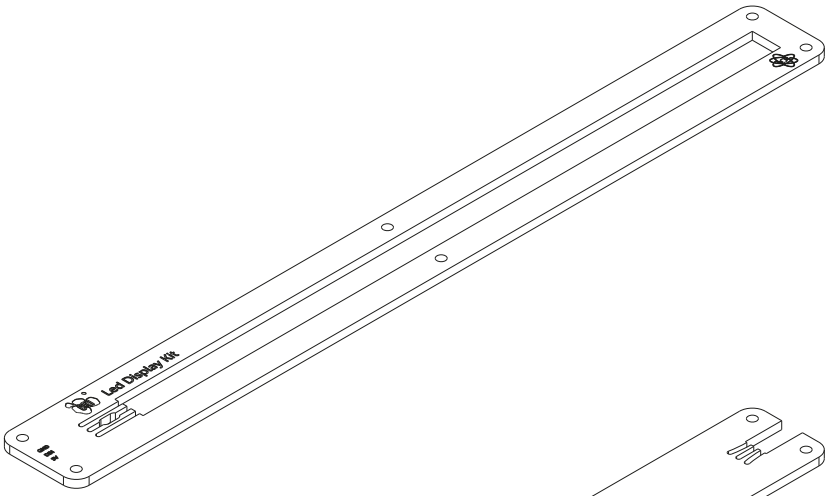




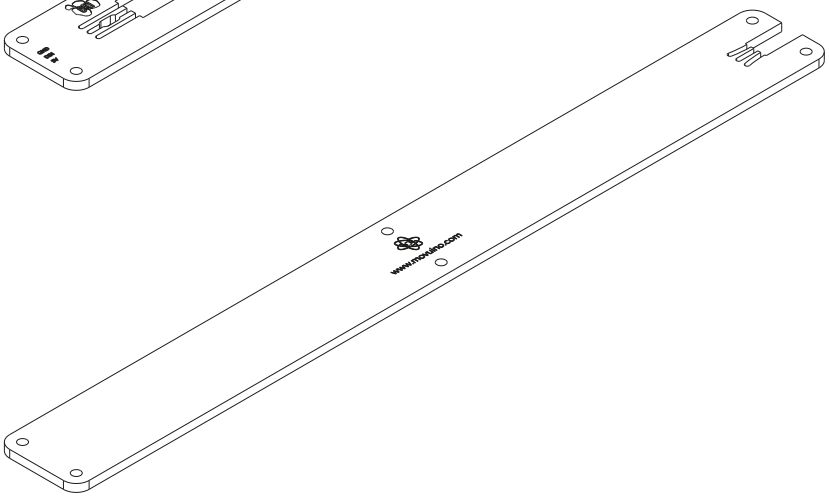
LED DISPLAY

TO LASER CUT

- **Plywood** — **3mm thick**



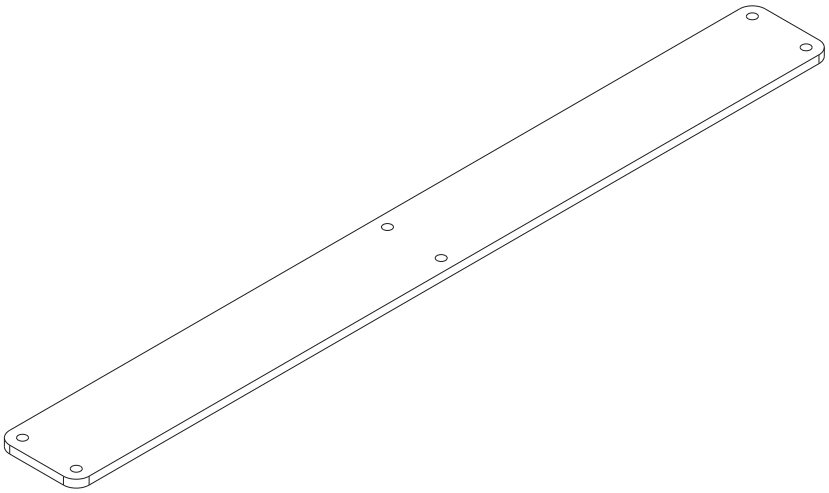
A1 ***x1*** **Front panel**



A2 ***x1*** **Back panel**

BalanceBoard/01_MakingRessources/BalanceBoard_6mm.svg

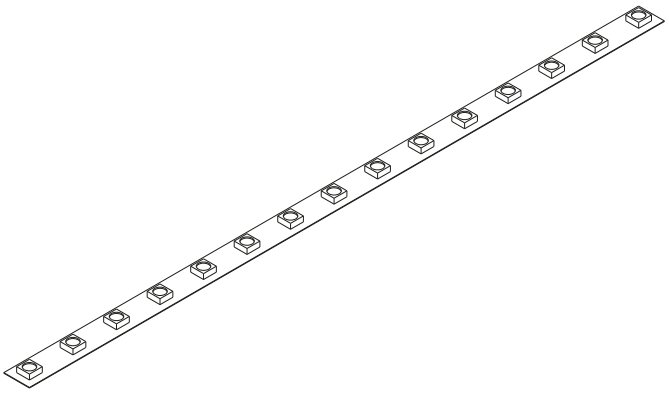
- **Plexyglass** — **3mm thick**



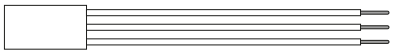
B ***x2*** **Plexyglass case**

BalanceBoard/01_MakingRessources/BalanceBoard_3mm.svg

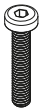
TO BUY



C1 *x1* Neopixel RGB Led strip



C2 *x1* Female Dupont wire



C3 *x4* M3 16mm CHC screws

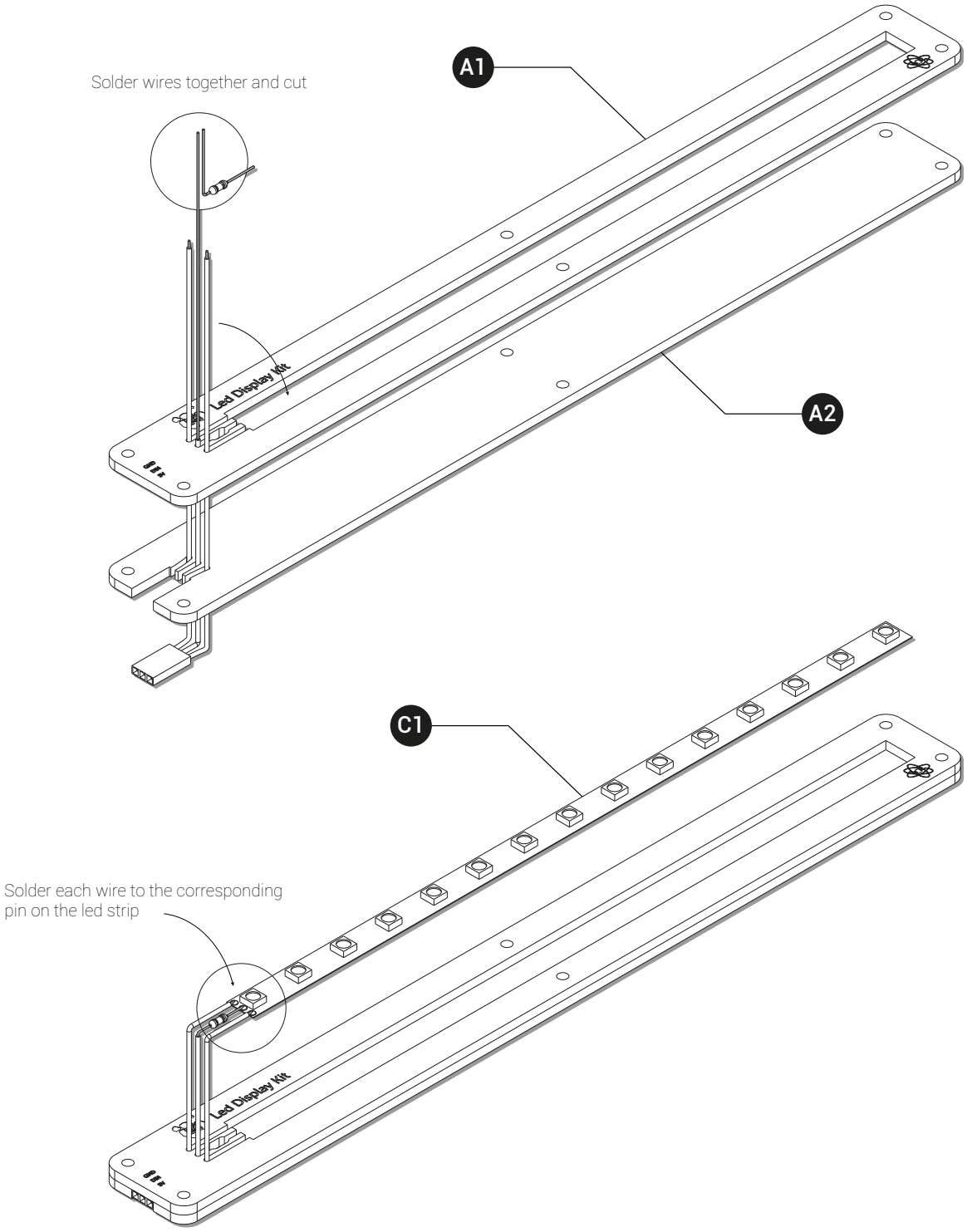
C4 *x4* M3 Serrated washers

C5 *x4* M3 Nuts

ASSEMBLY

LED DISPLAY

7



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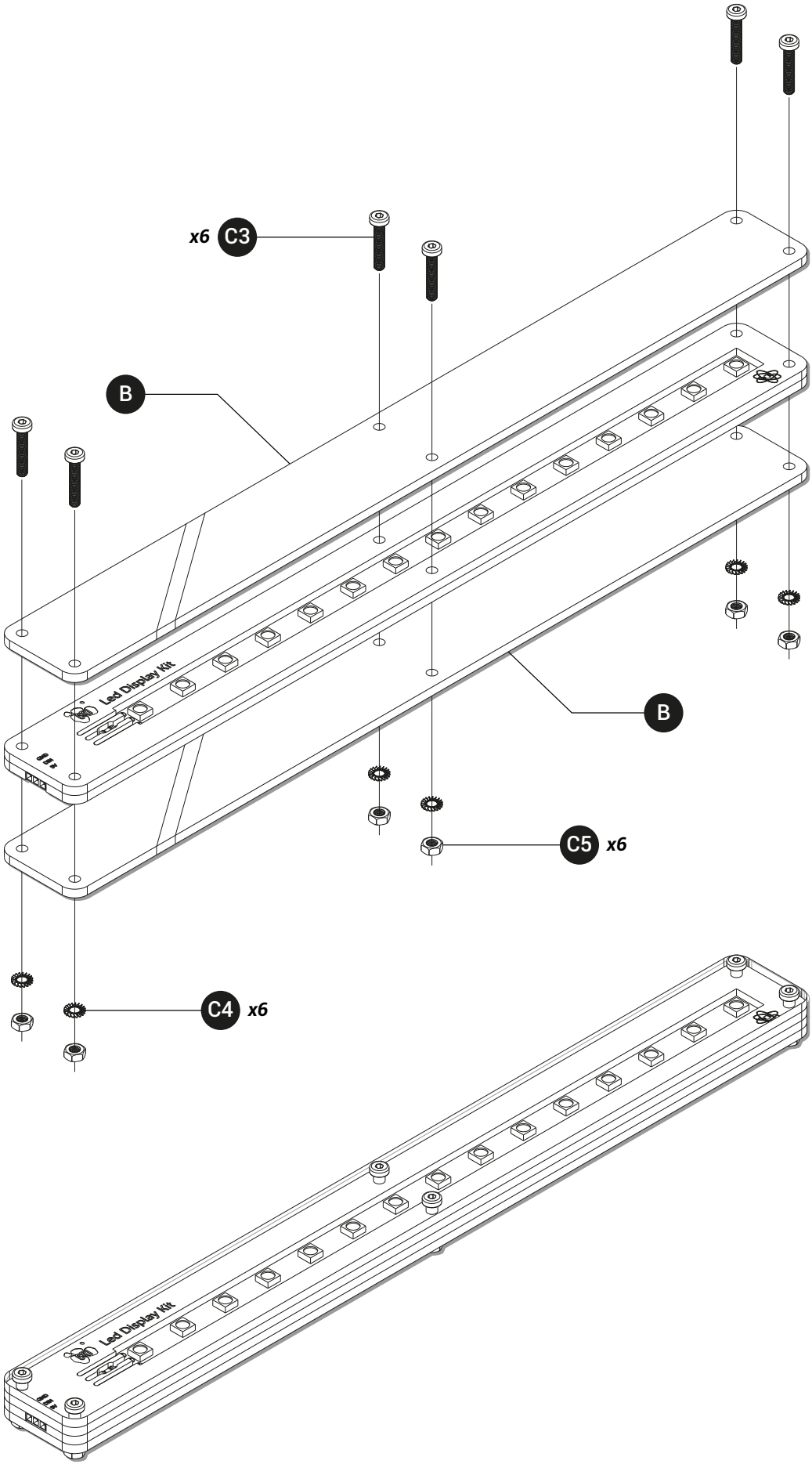
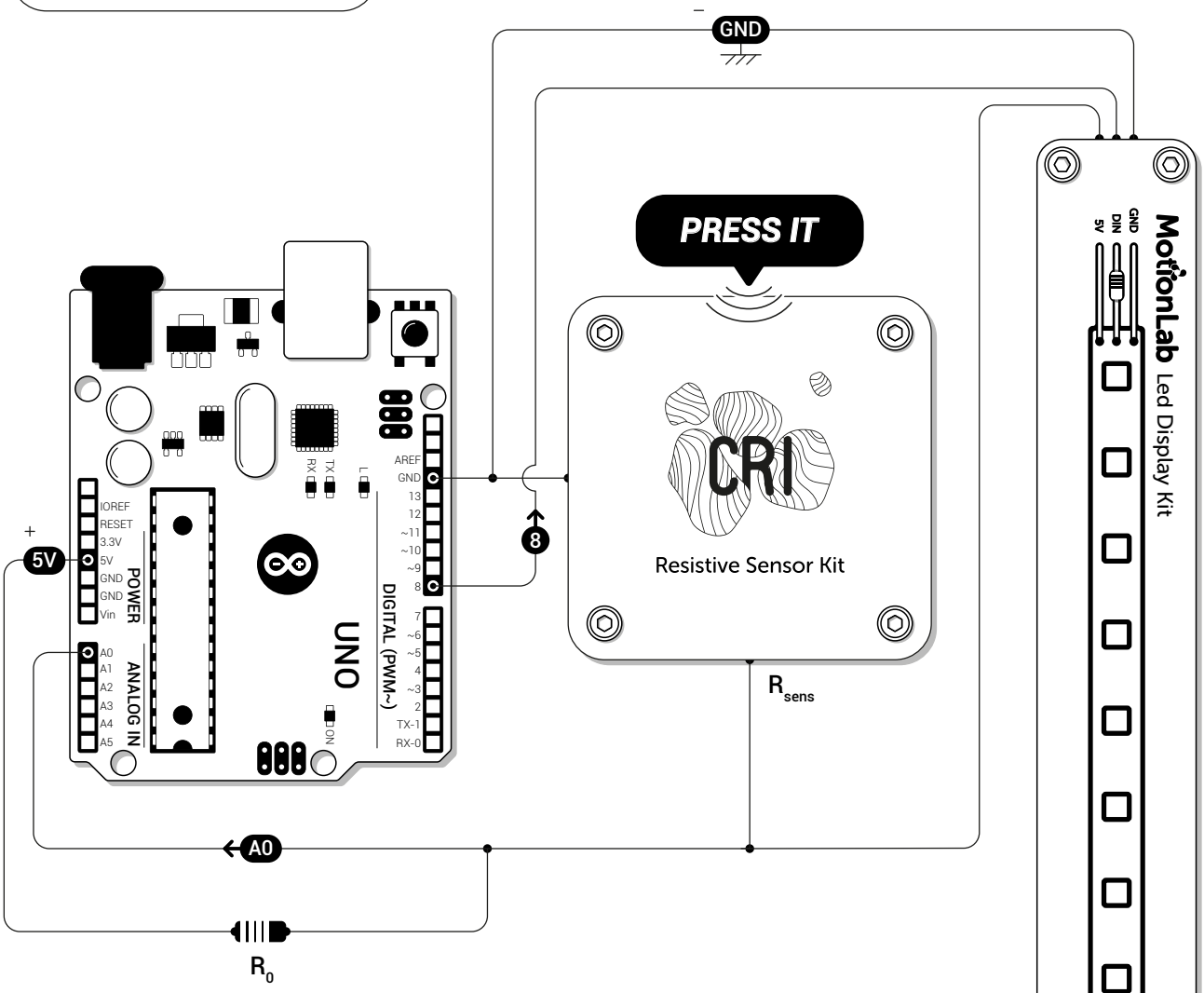


VOLTAGE DIVIDER

DEMO



Load Arduino program from...

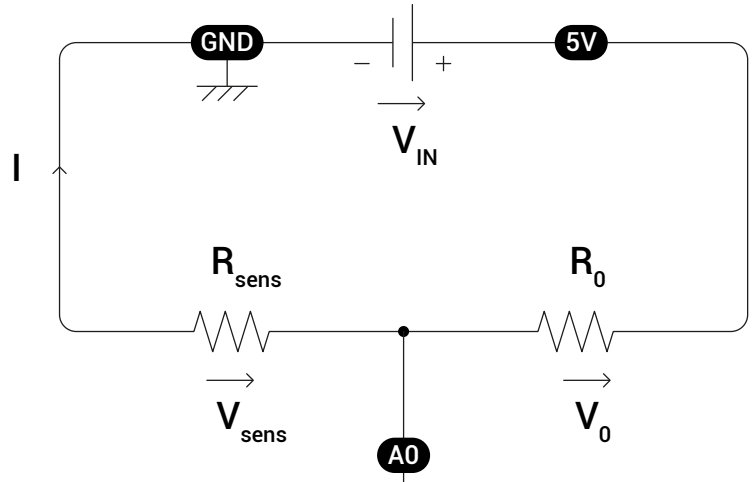
ElectricSensorsKit/Arduino/ResistiveDividerDisplay.ino

This program highlights **voltage divider**'s application.

By pressing the **Resistive Sensor Kit** with your hand, you see the led strip reacting in function of the amount of pressure you apply.

The **Resistive Sensor Kit** acts like a **variable resistance**, the more you press it, the more the current pass through the resistive foam and so the more its inner resistance descreases.

PRINCIPLE

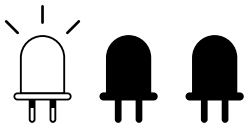


Voltage divider

Receive and map voltage value to control leds

Arduino

8



Leds dislay

FORMULA

$$V_{IN} = V_0 + V_{sens}$$

$$V_0 = I_0 \cdot R_0$$

$$V_{sens} = I_{sens} \cdot R_{sens} = A0$$

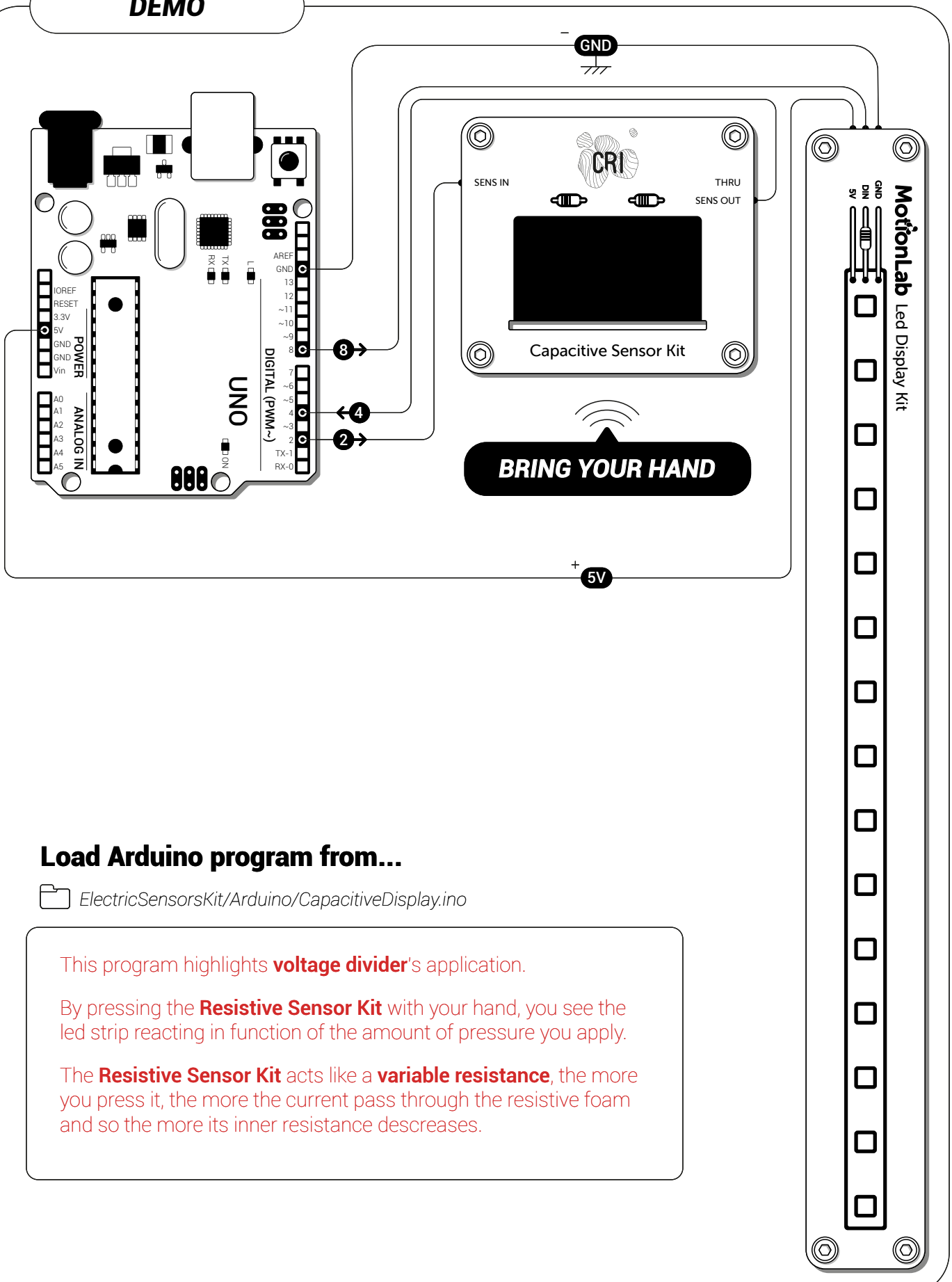
$$I = I_{IN} = I_0 = I_{sens}$$

$$A0 = \frac{R_{sens}}{R_0 + R_{sens}} \cdot V_0$$

$$R_{sens} = \frac{V_{IN}}{A0} \cdot R_0 - R_0$$

RC CIRCUIT

DEMO



Load Arduino program from...

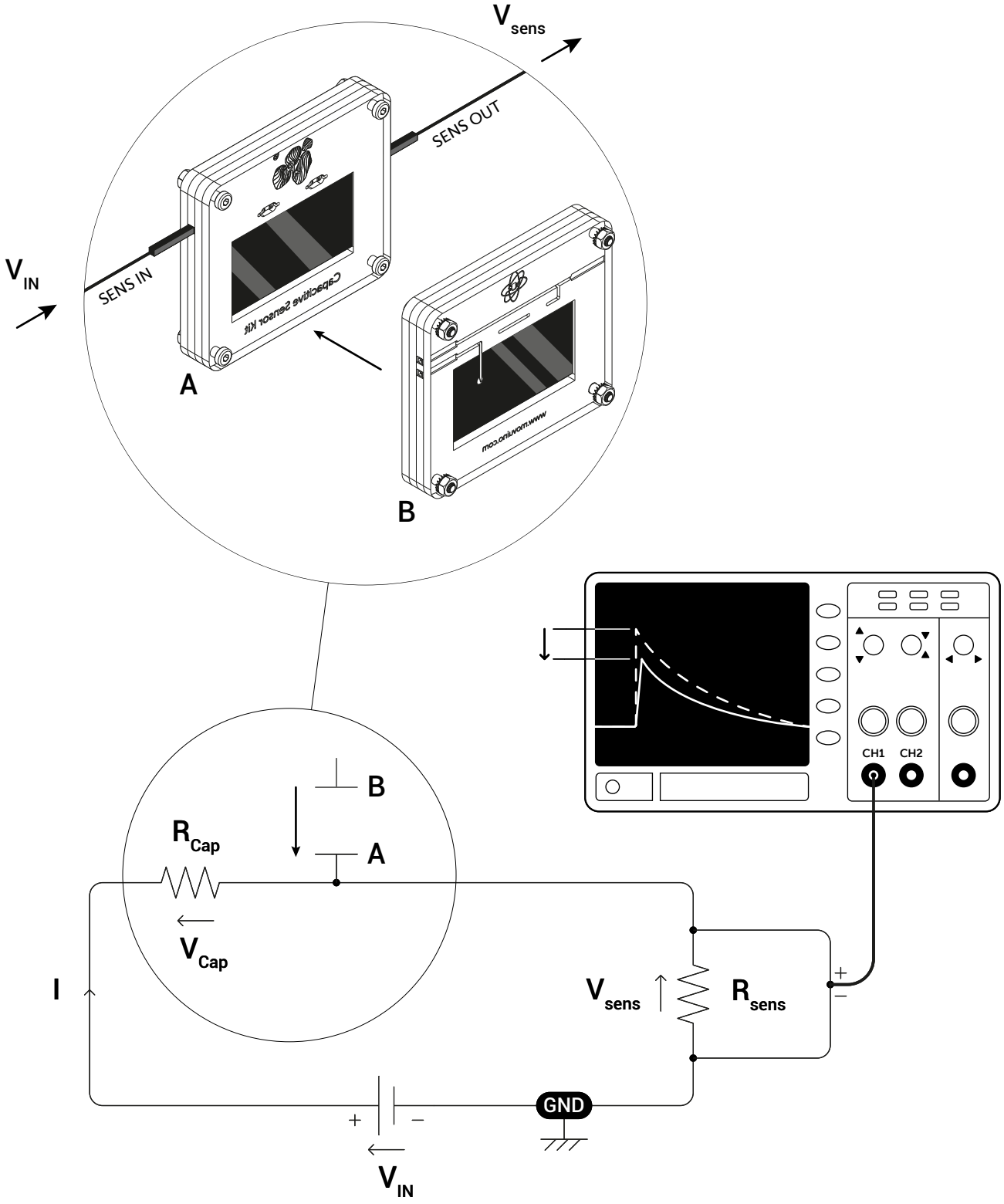
ElectricSensorsKit/Arduino/CapacitiveDisplay.ino

This program highlights **voltage divider**'s application.

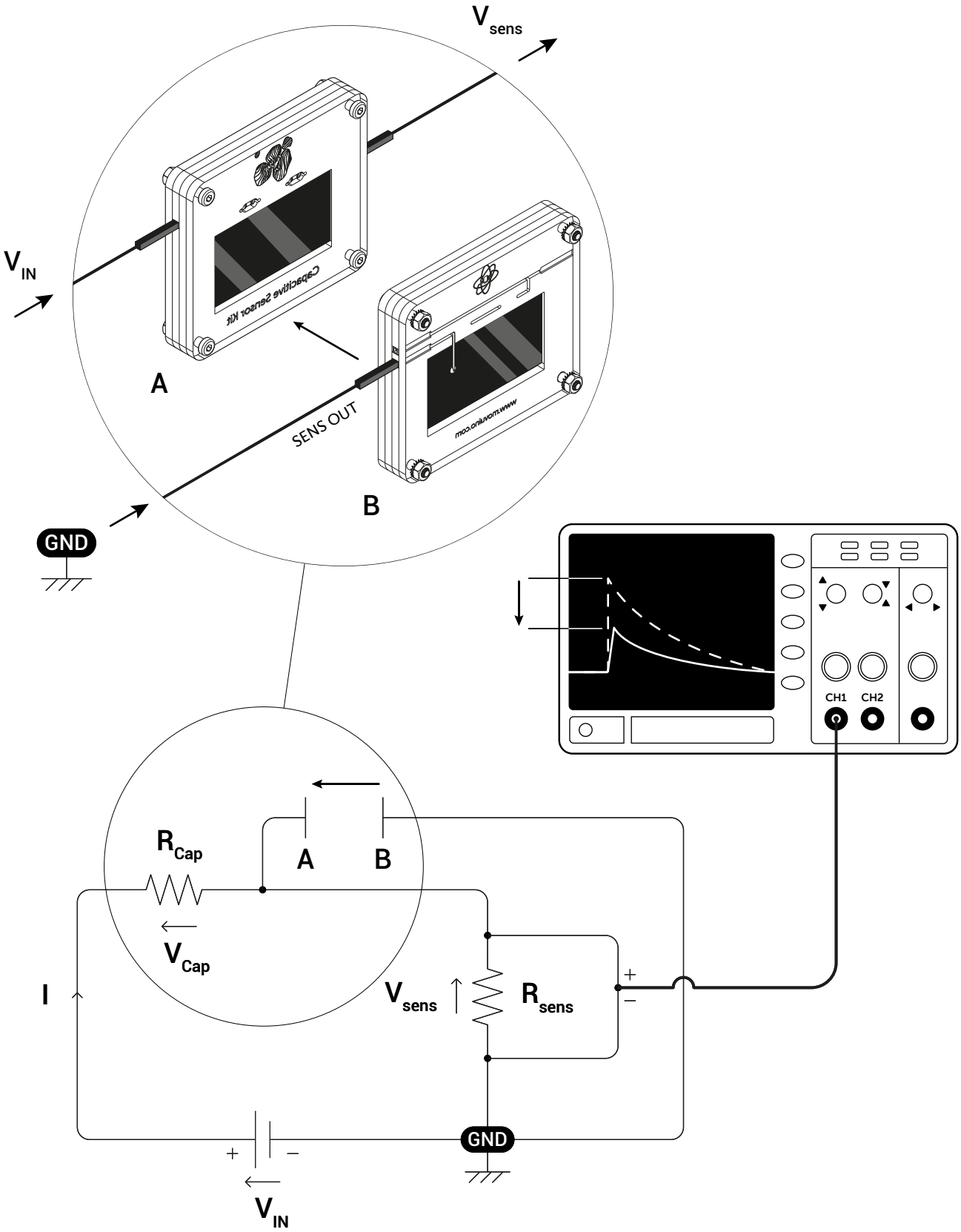
By pressing the **Resistive Sensor Kit** with your hand, you see the led strip reacting in function of the amount of pressure you apply.

The **Resistive Sensor Kit** acts like a **variable resistance**, the more you press it, the more the current pass through the resistive foam and so the more its inner resistance descreases.

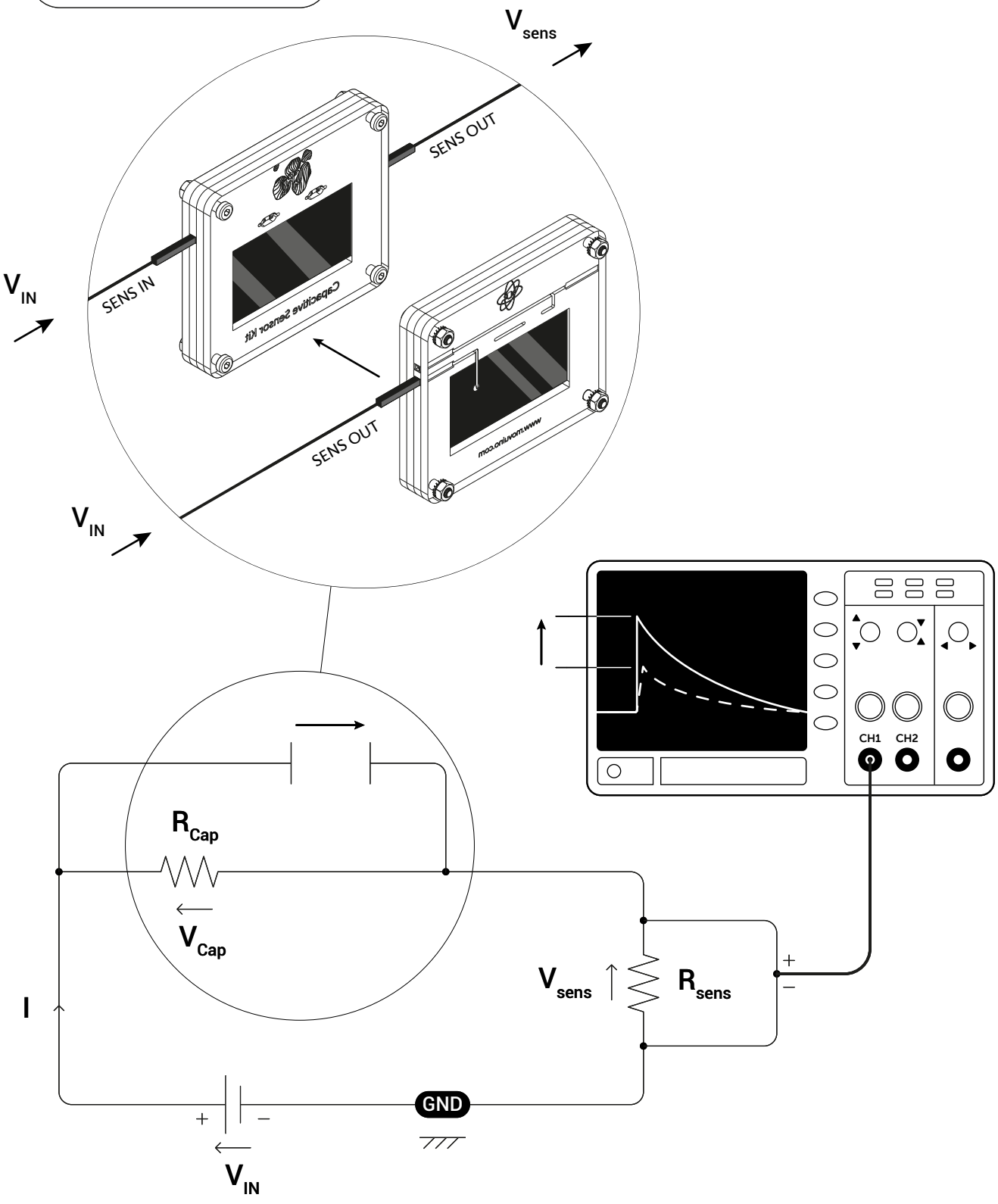
THEORY


V sens
SENS OUT
V IN
SENS IN
A
B
CH1
CH2
R Cap
V Cap
I
V sens
R sens
GND
V IN

THEORY


V sens
V IN
A
SENS OUT
B
GND
CH1
CH2
R Cap
A
B
V Cap
I
V sens
R sens
+
−
GND
+
−
V IN

THEORY


V sens
SENS OUT
V IN
SENS IN
SENS OUT
V IN
CH1
CH2
R Cap
V Cap
I
V sens
R sens
GND
V IN


CRI