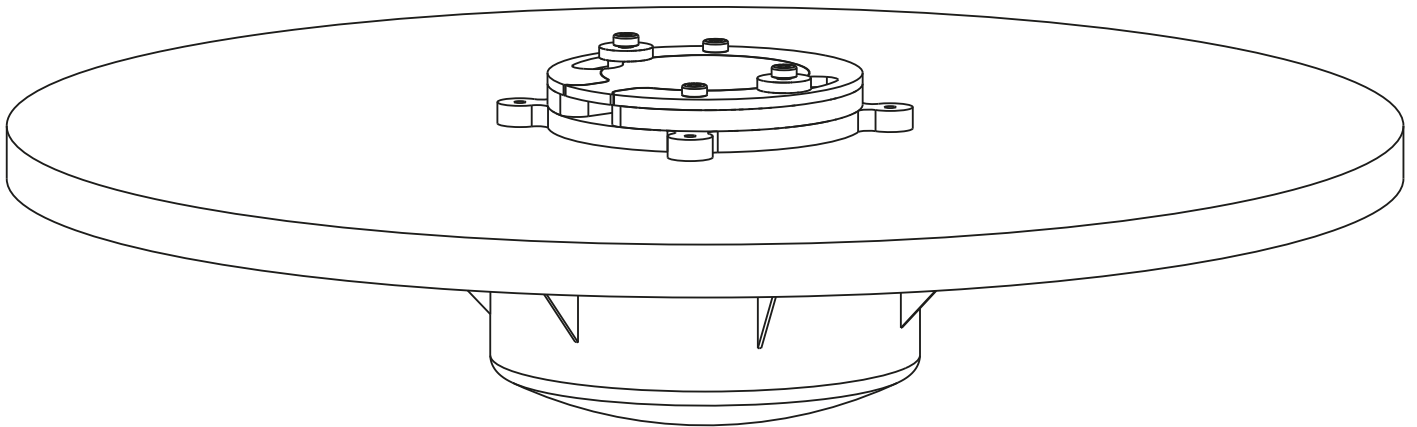


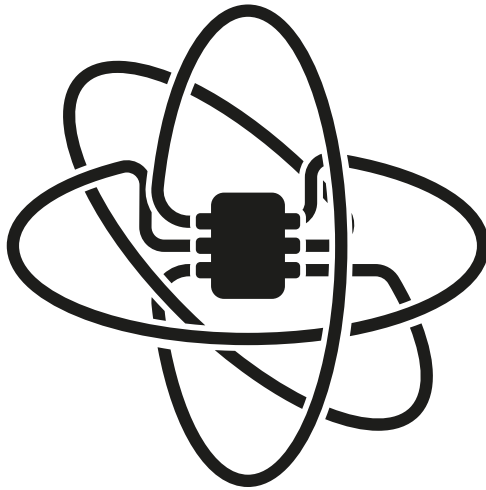
# HOW TO BUILD BALANCE BOARD



by **Adrien Husson**  
for the







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

Project presentation:

<http://www.movduino.com/index.php/portfolio/balance-board/>



All files of the project can be found on:

<https://github.com/hssnadr/BalanceBoard>

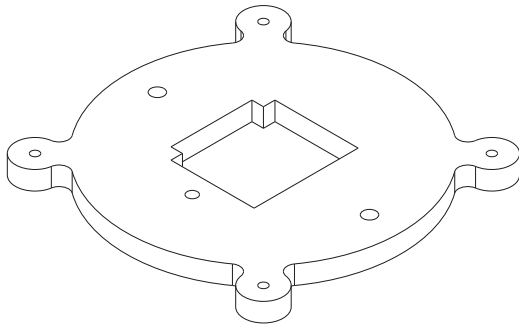




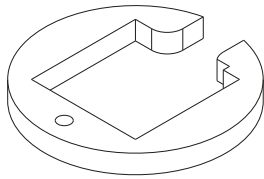
## TO LASER CUT

BalanceBoard/01\_MakingRessources/BalanceBoard\_6mm.svg

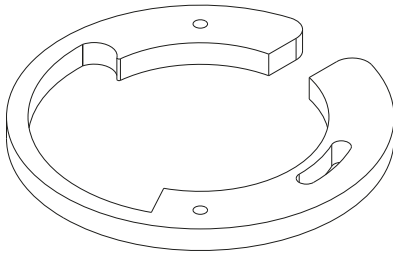
6mm thick



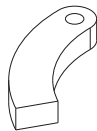
**A1** x1 Base



**A2** x1 Movuino case



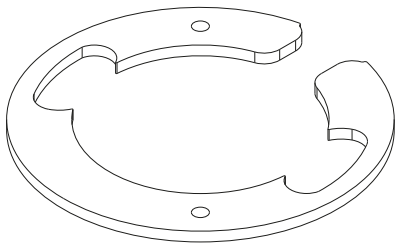
**A3** x1 Spring crown



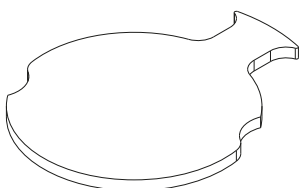
**A4** x1 Movuino case

BalanceBoard/01\_MakingRessources/BalanceBoard\_3mm.svg

3mm thick



**B1** x1 Spring case



**B2** x1 Cap



**B3** x2 Washer



**B4** x2 Brace

## TO BUY



**C1** x1 M4 8mm FHC screw



**C4** x2 M4 washers



**C2** x2 M4 8mm CHC screw



**C4** x2 M4 locknuts



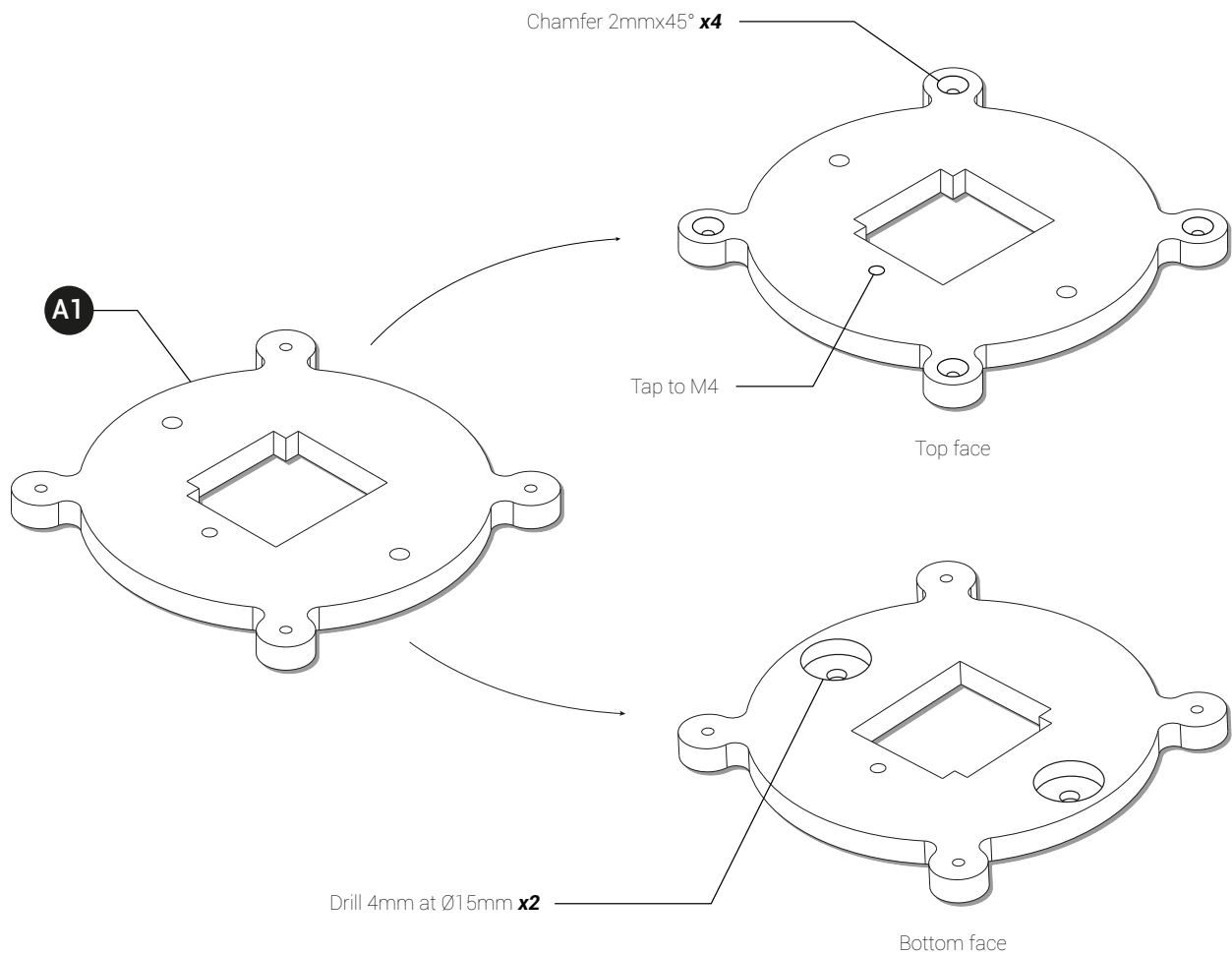
**C3** x2 M4 16mm CHC screw



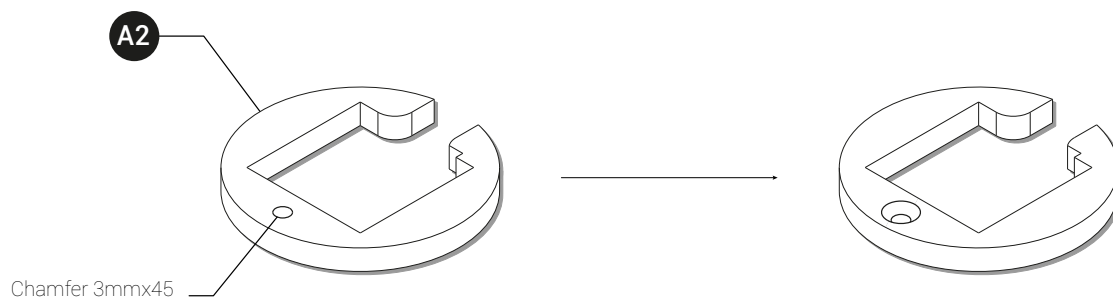
**C4** x9 M3 5mm self-tapping  
screws

# ASSEMBLY

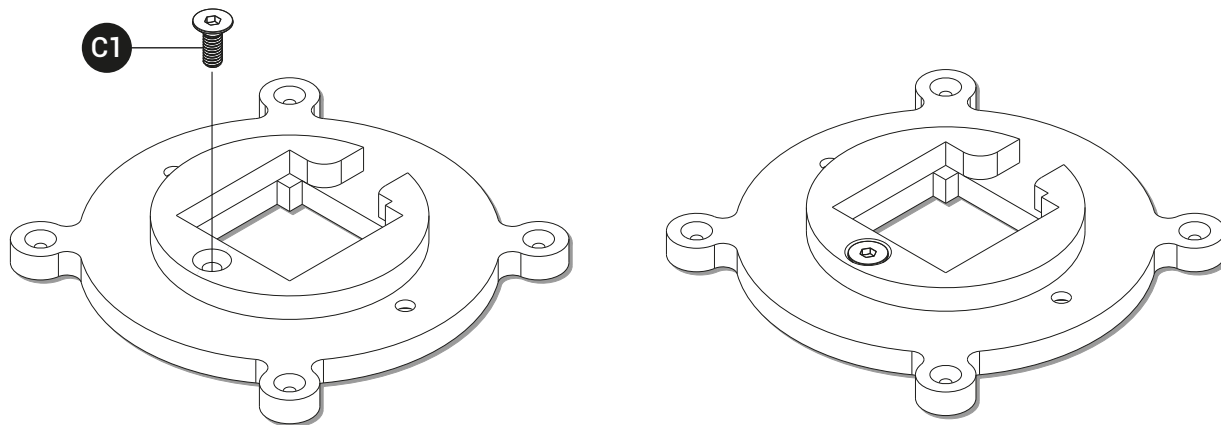
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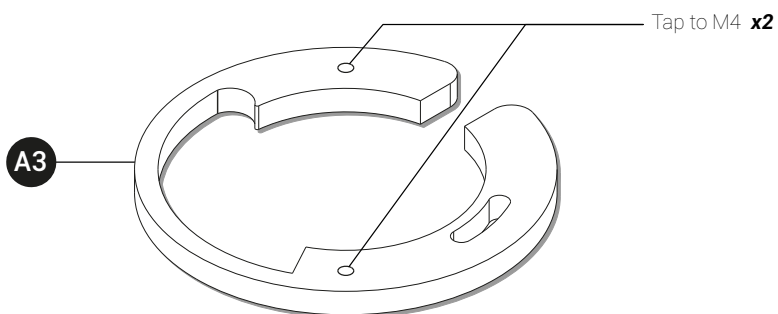
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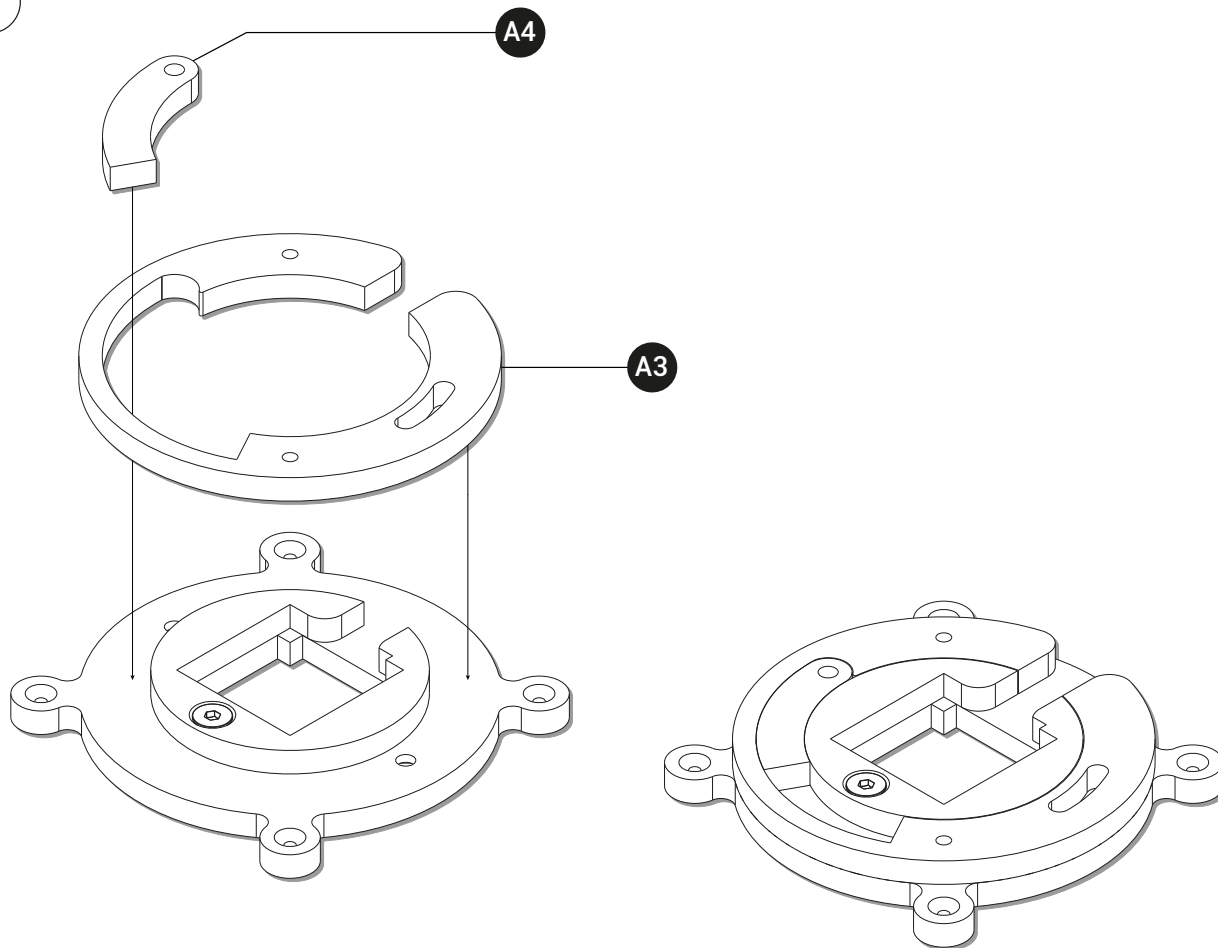
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3

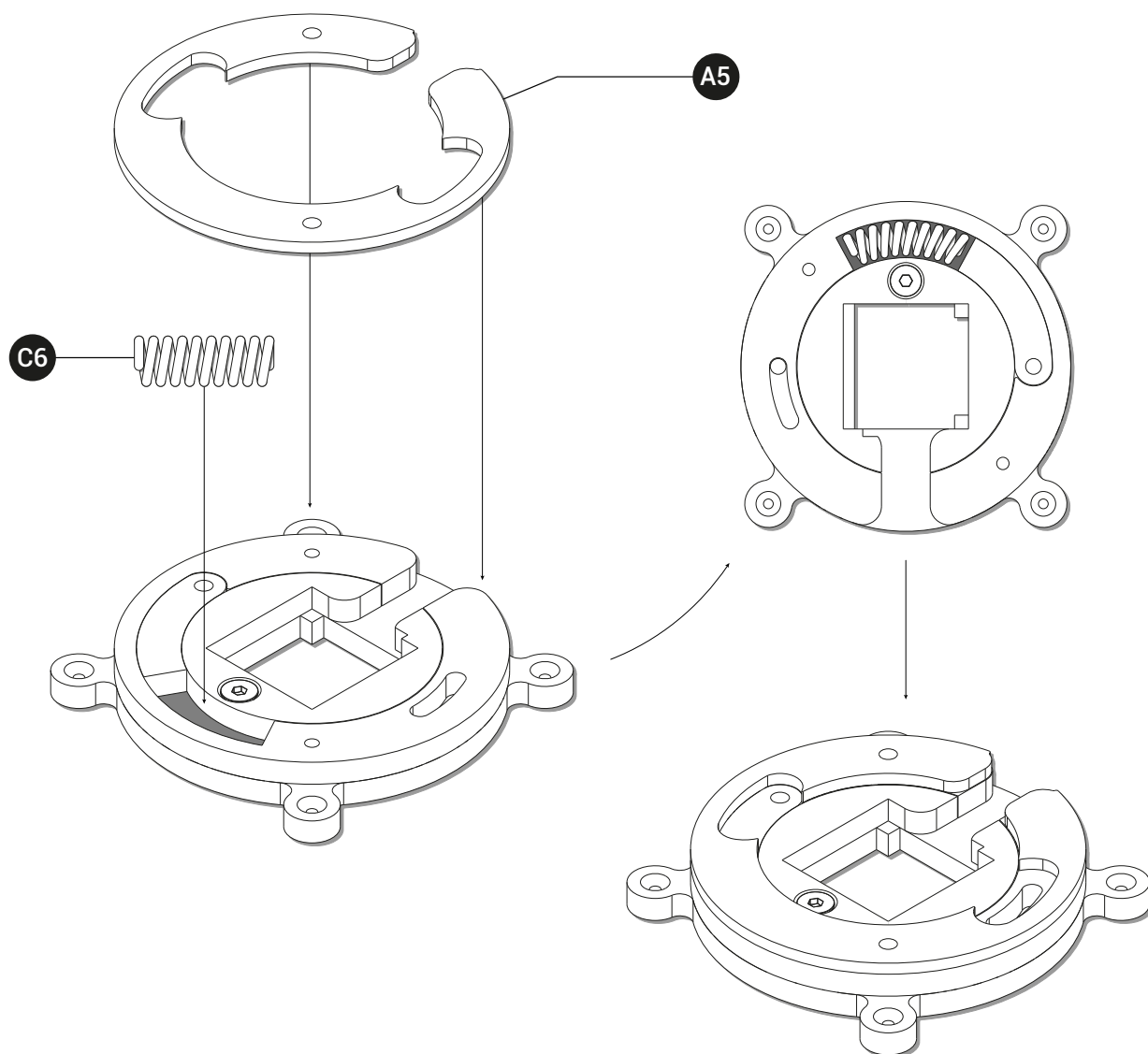


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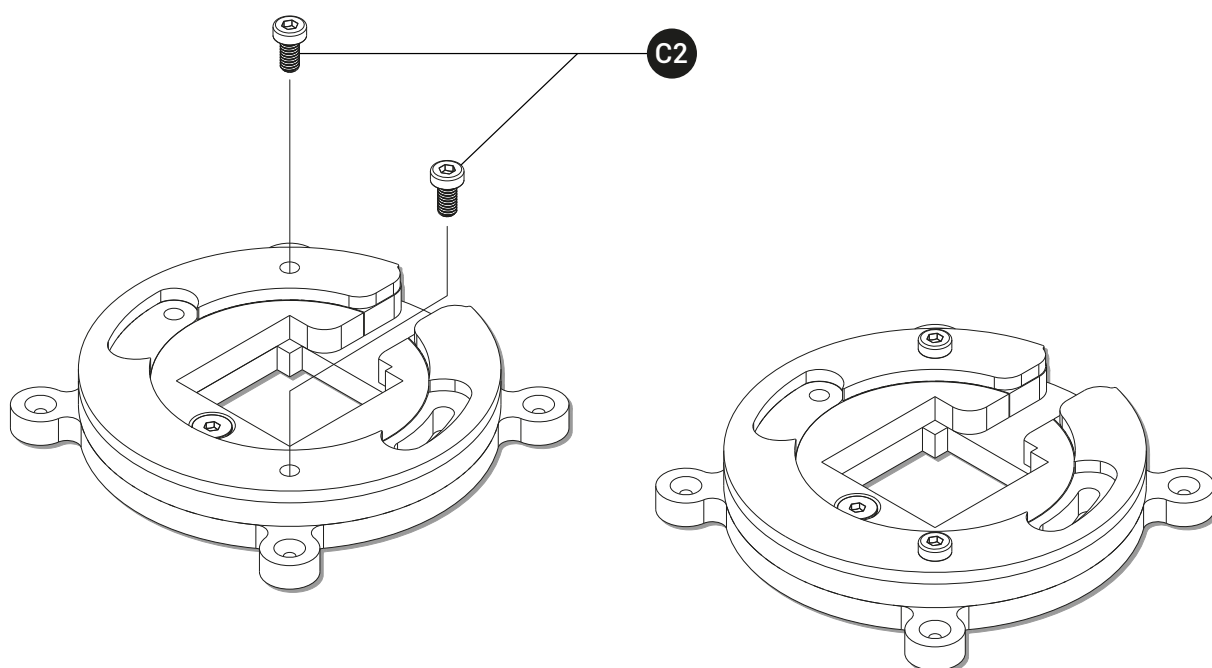




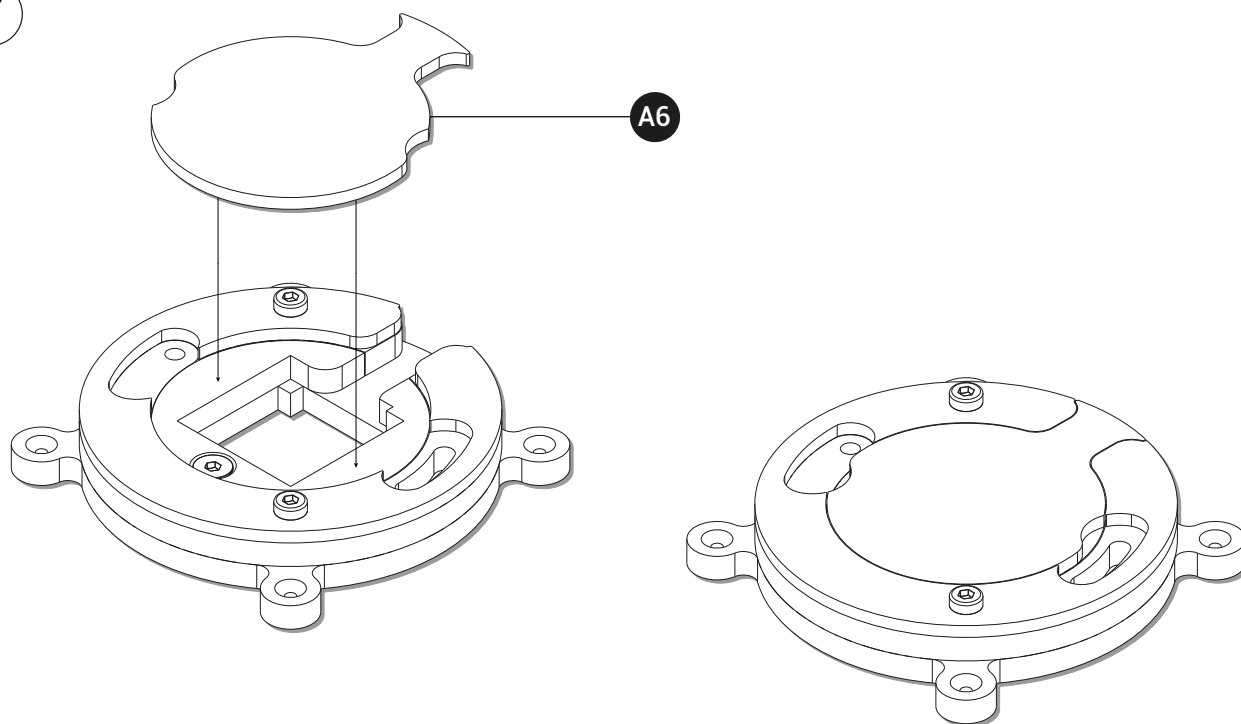
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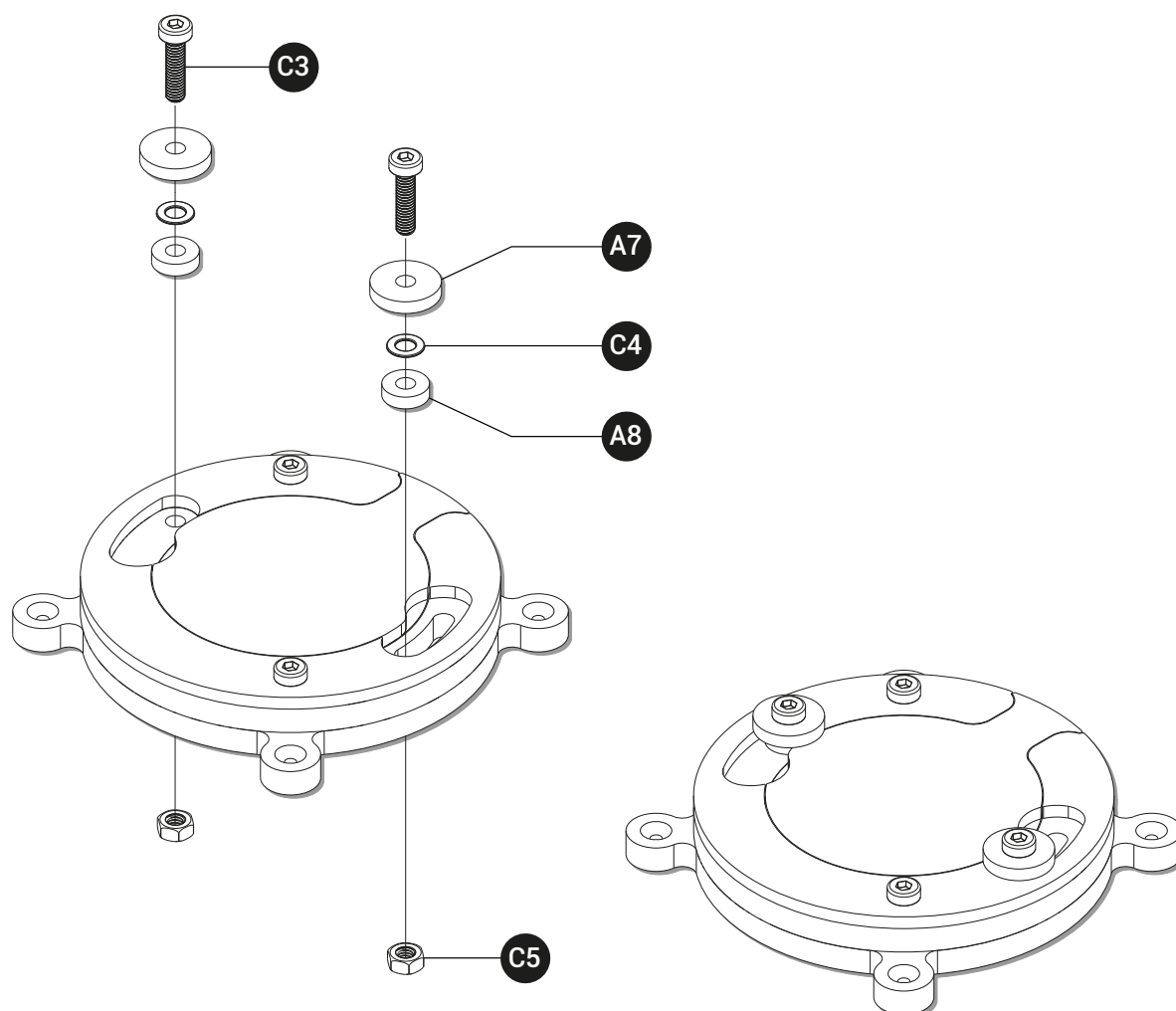
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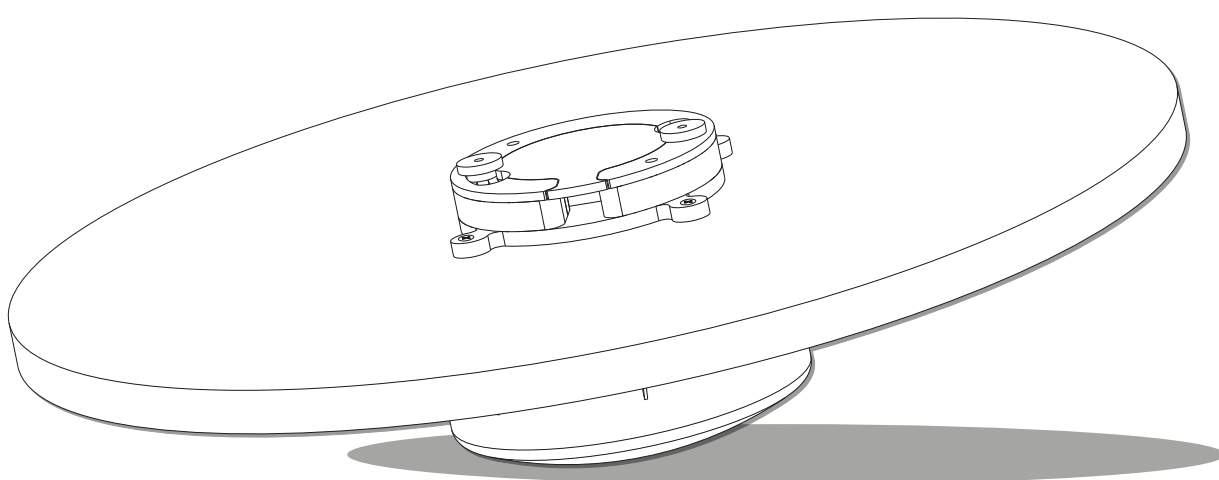
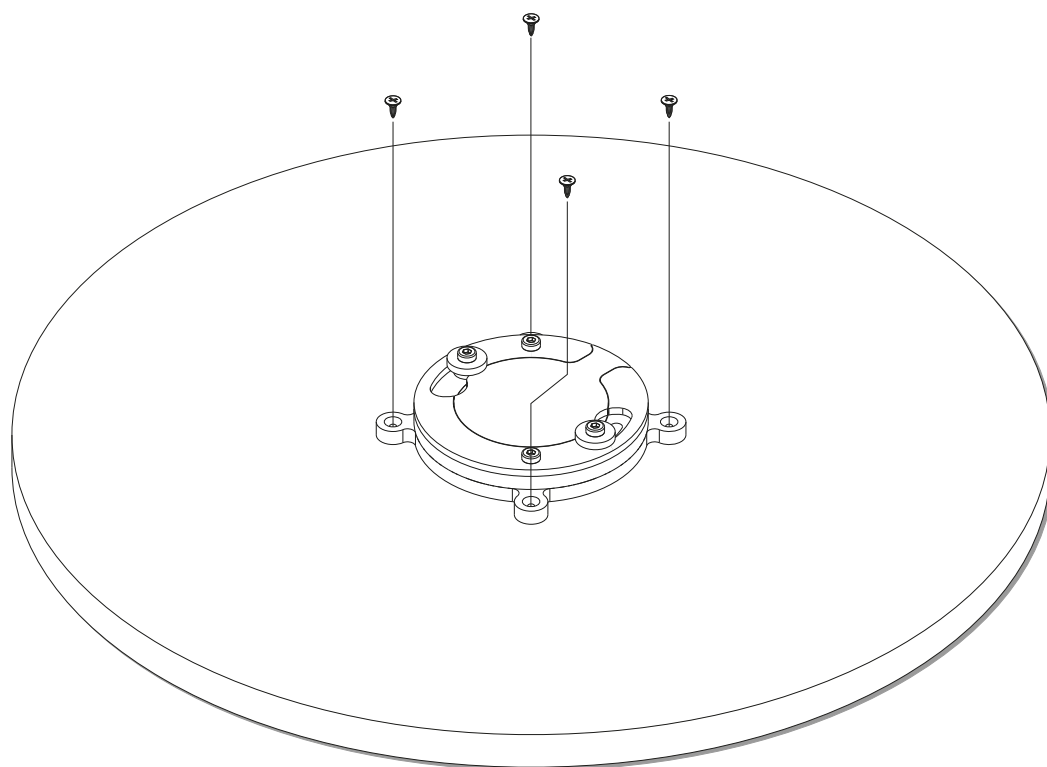
7



8



9



# SET-UP

1 Download and install:



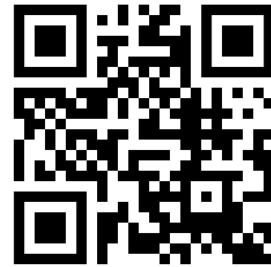
**Movuina** on [www.movuino.com](http://www.movuino.com)



**PureData** on [www.puredata.info](http://www.puredata.info)

**Movuino**

[www.movuino.com](http://www.movuino.com)



2  Open **PureData**

You'll need to install the **MrPeach** library to receive the OSC messages from **Movuina**, go to:

**Help/Find Externals**

Search for «MrPeach» in the search tab, click on the result to start installation, once it's complete restart **PureData** and run the **BalanceBoard\_Application.pd** patch file.



*BalanceBoard/02\_PureData/BalanceBoard\_Application.pd*

3



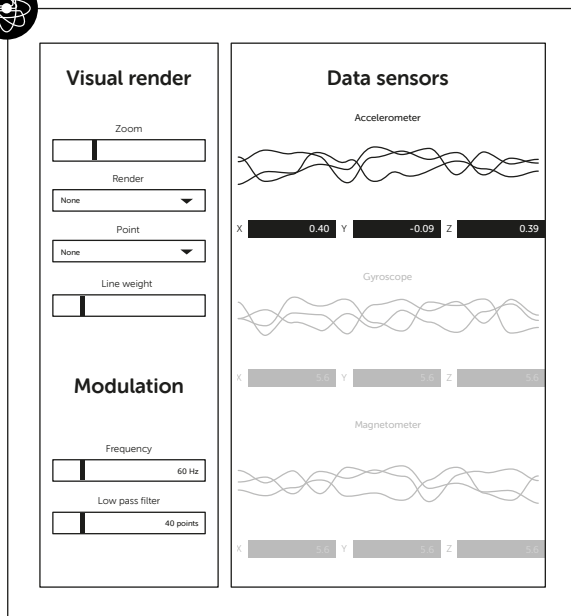
Launch **Movuina** and set-up by following the **Quick Start** tutorial

## Quick Start

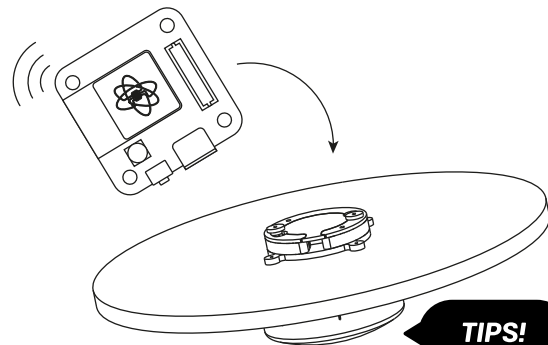
[www.movuino.com/index.php/quick-start](http://www.movuino.com/index.php/quick-start)



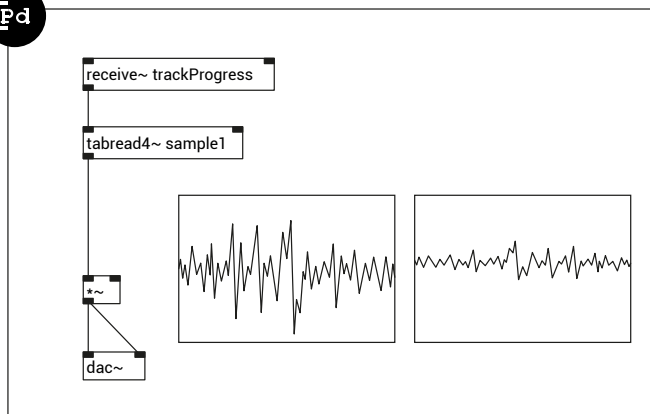
Once its done, you can directly receive the acceleration data sensed by the **Movuino** (or **Streamo**) into the **PureData** patch. There the data are processeced to generate sound modulations.



Acceleration data can be smoothed with the **Low pass filter** parameter

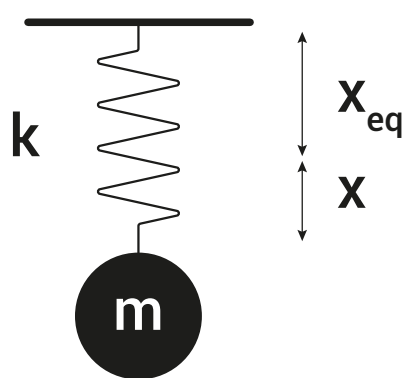


OSC message (127.0.0.1 port 3000)  
/movuino or /streamo



# PRINCIPLE

To sense acceleration, the accelerometers are based on the **Newton's 2nd law**, this law highlights a direct link between the size of a spring and the acceleration of its mass.



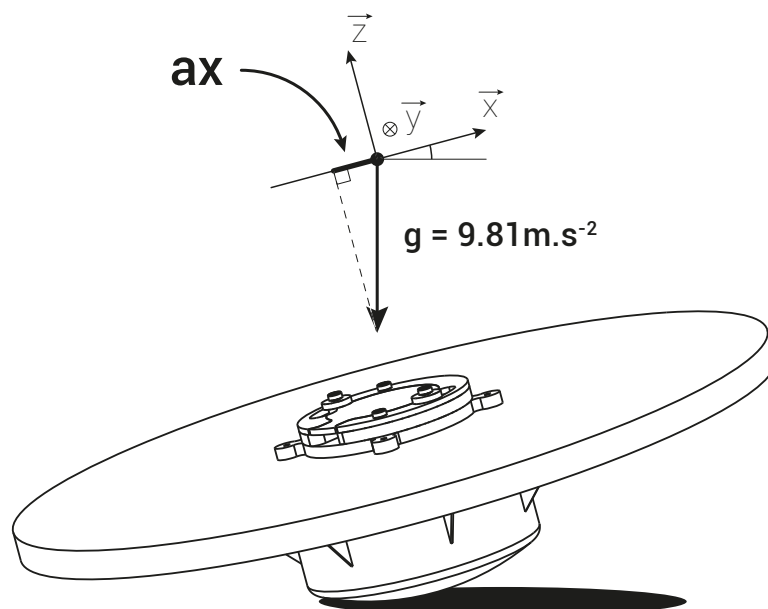
$$\frac{d^2\vec{x}}{dt^2} m = \sum \vec{F}_{ext}$$

$$\frac{d^2x}{dt^2} m = k\Delta x - mg$$

On this extremely simplified view of the electronic embedded in an accelerometer, you notice the sensor will be affected by the **gravity** in addition to its own acceleration.

Most of the time this extra data is a noise, but in our case this will allow us to get the orientation of the **Movuino** simply by reading the **acceleration data on the XY plan**.

The way the **Movuino** is placed on the balance plate minimizes its own acceleration. Thus, the main acceleration component sensed is the effect of gravity. Smoothing the data with the **low pass filter** enhance this principle.







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