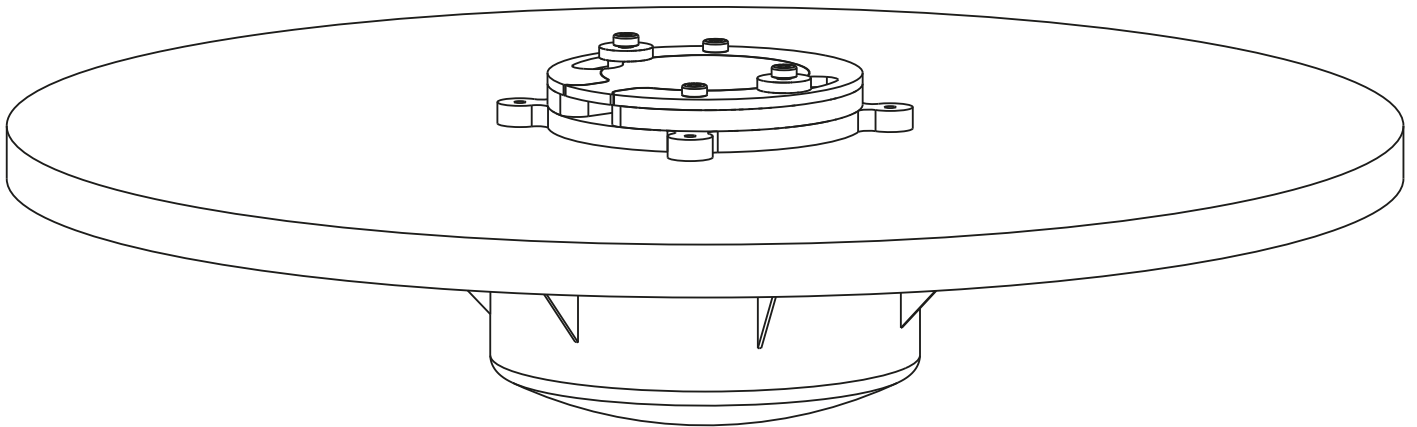
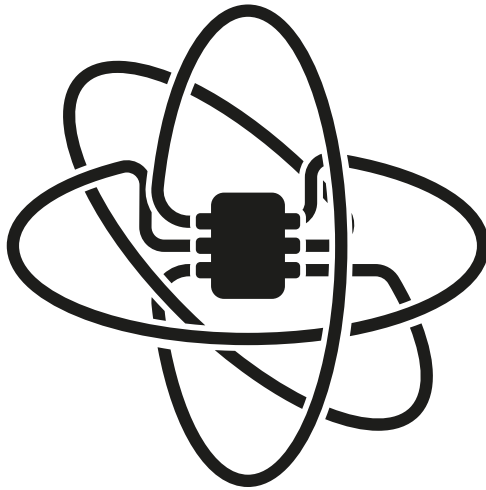


HOW TO BUILD BALANCE BOARD



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>

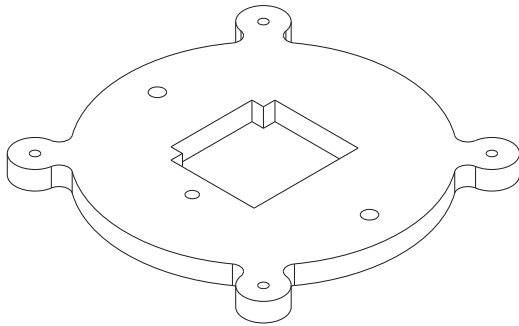


TO LASER CUT

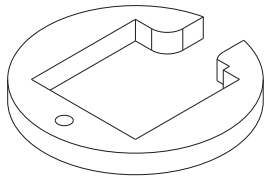


BalanceBoard/01_MakingRessources/BalanceBoard_6mm.svg

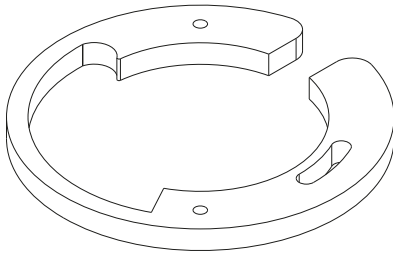
6mm thick



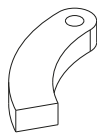
A1 x1 Base



A2 x1 Movuino case



A3 x1 Spring crown

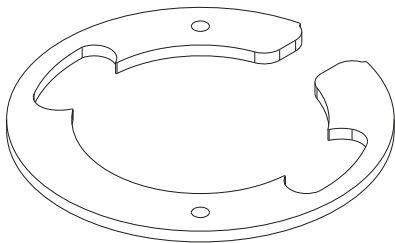


A4 x1 Movuino case

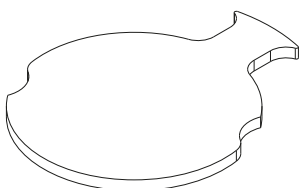


BalanceBoard/01_MakingRessources/BalanceBoard_3mm.svg

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



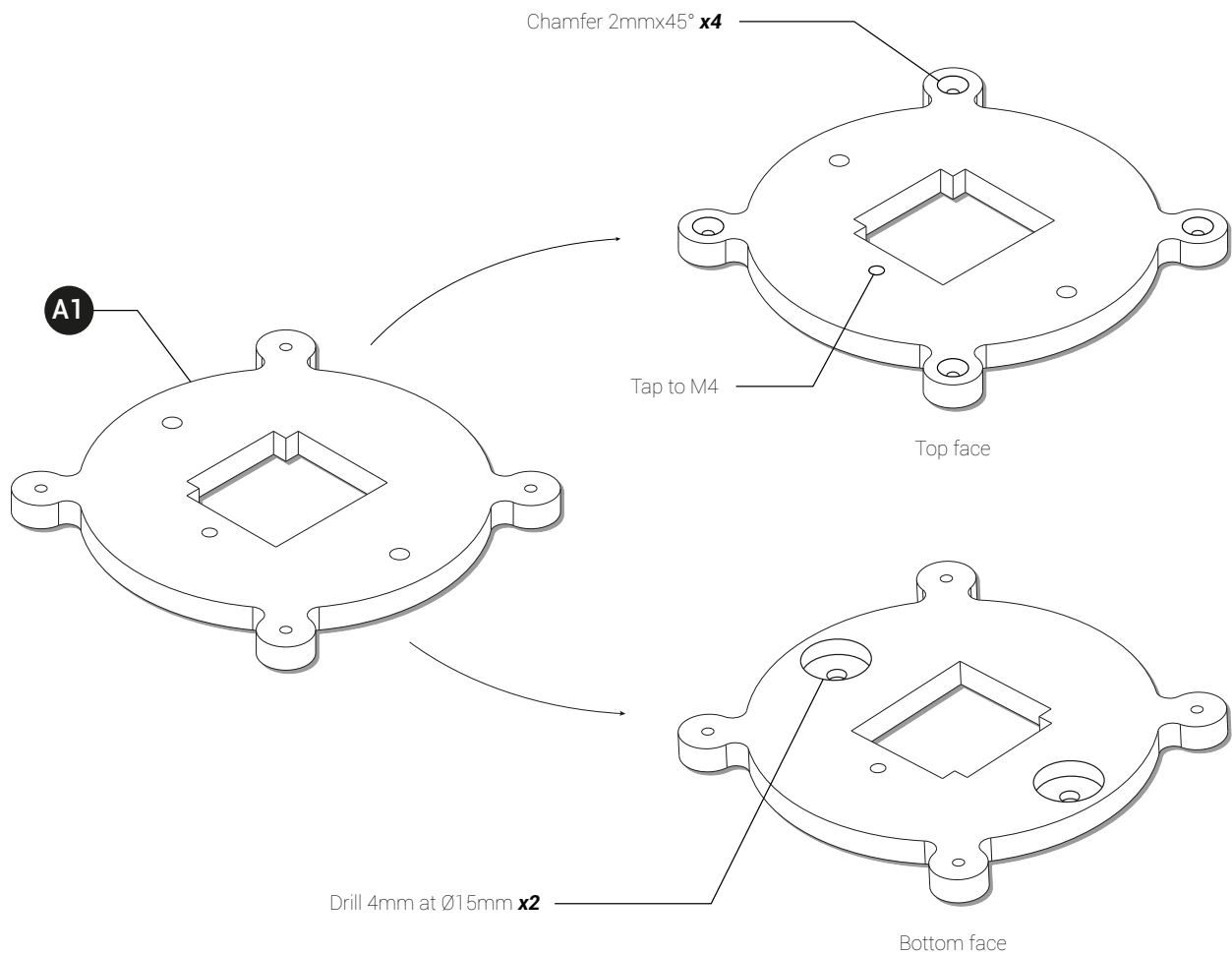
C3 x2 M4 16mm CHC screw



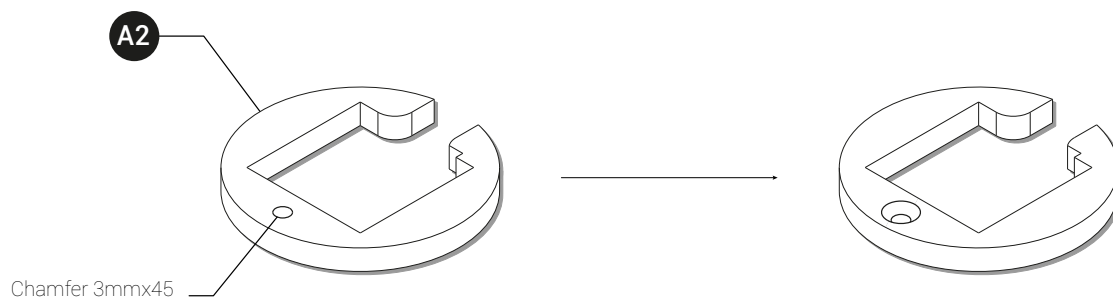
C4 x9 M3 5mm self-tapping
screws

ASSEMBLY

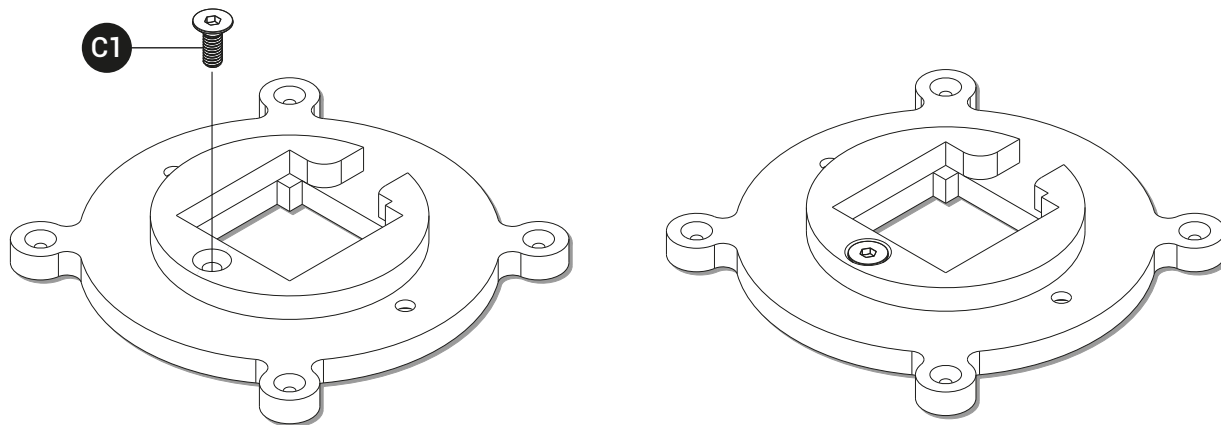
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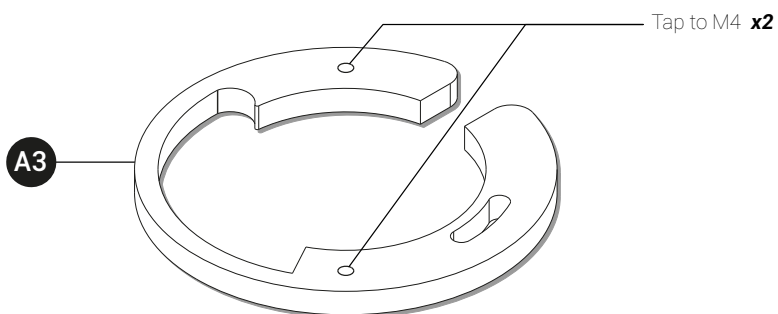
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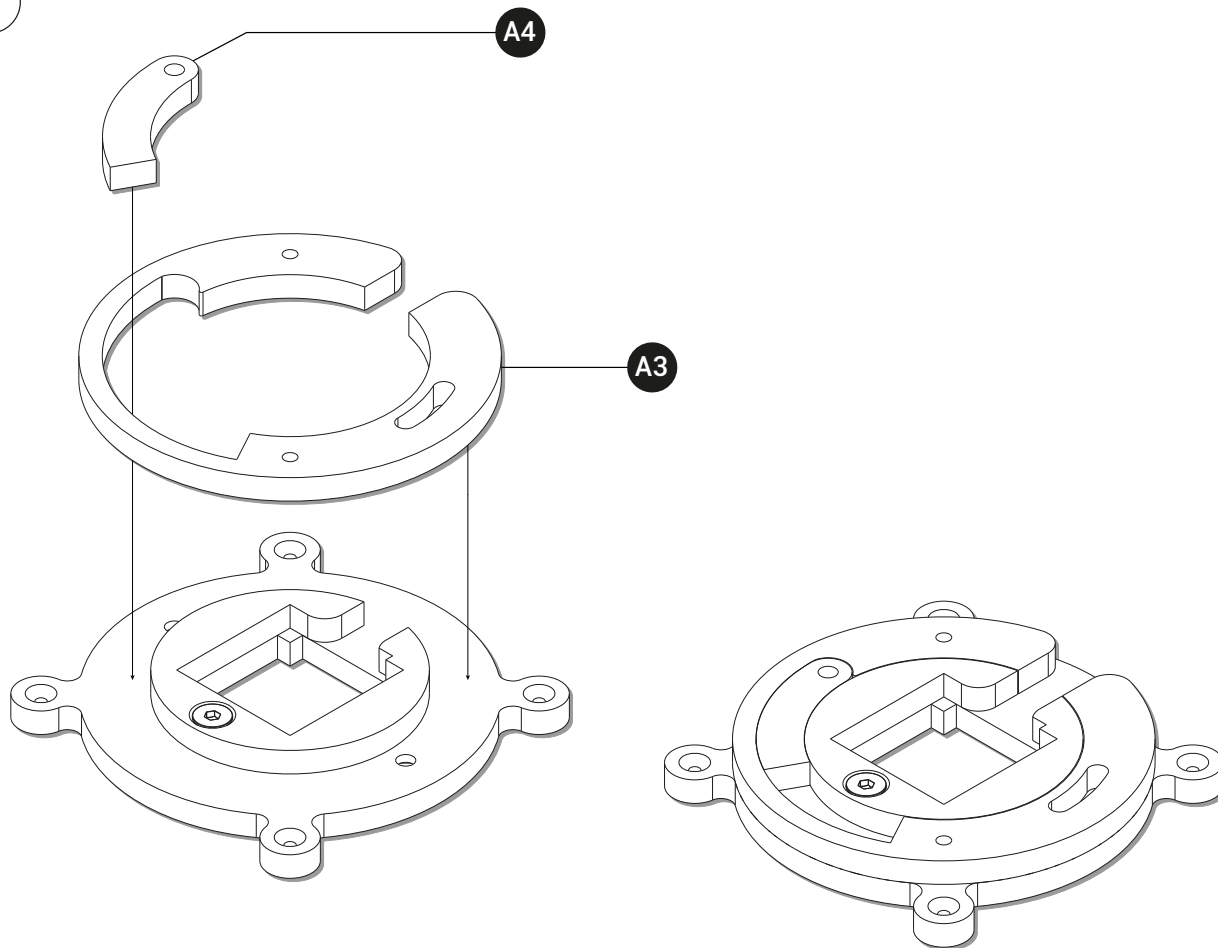
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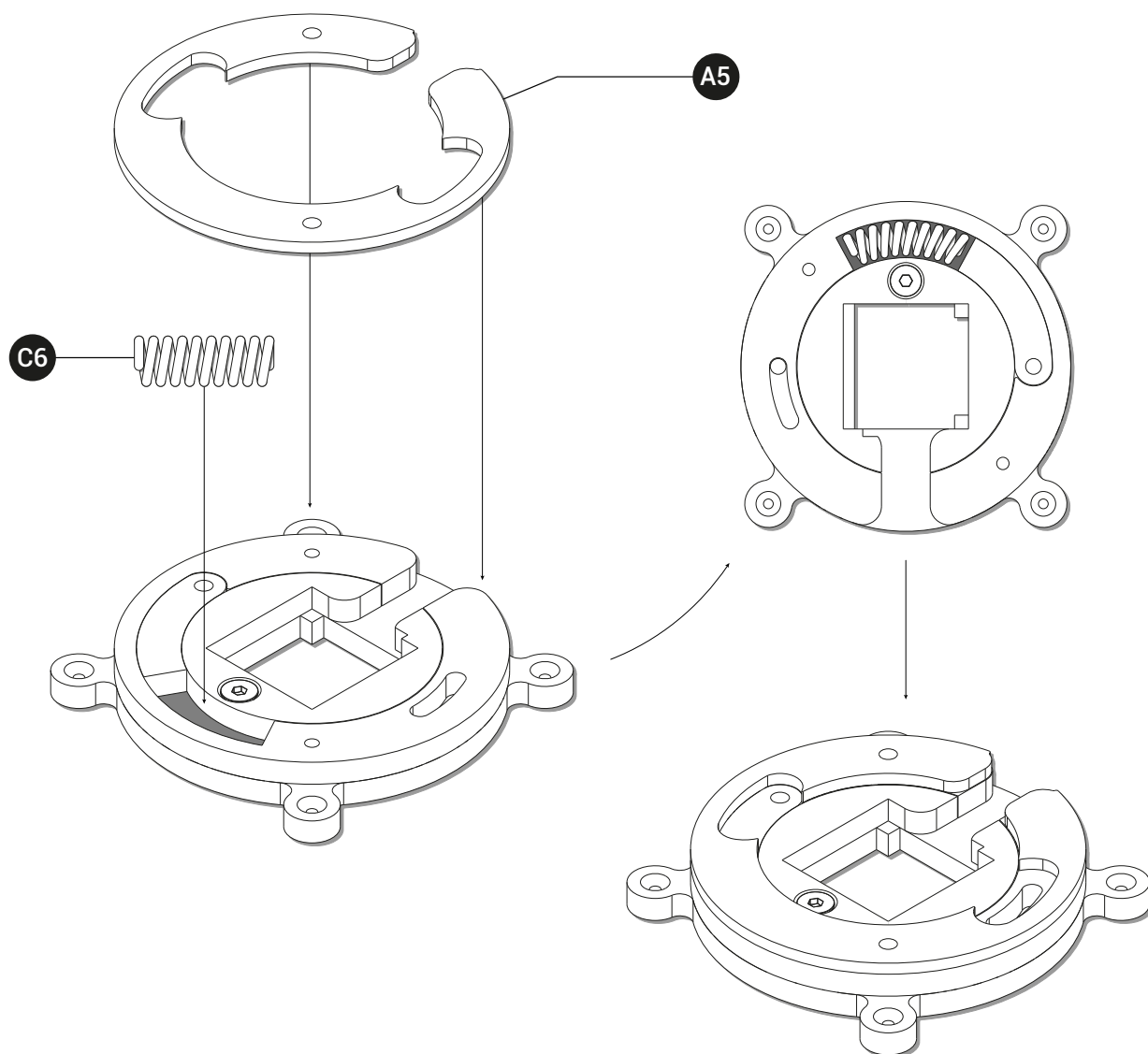
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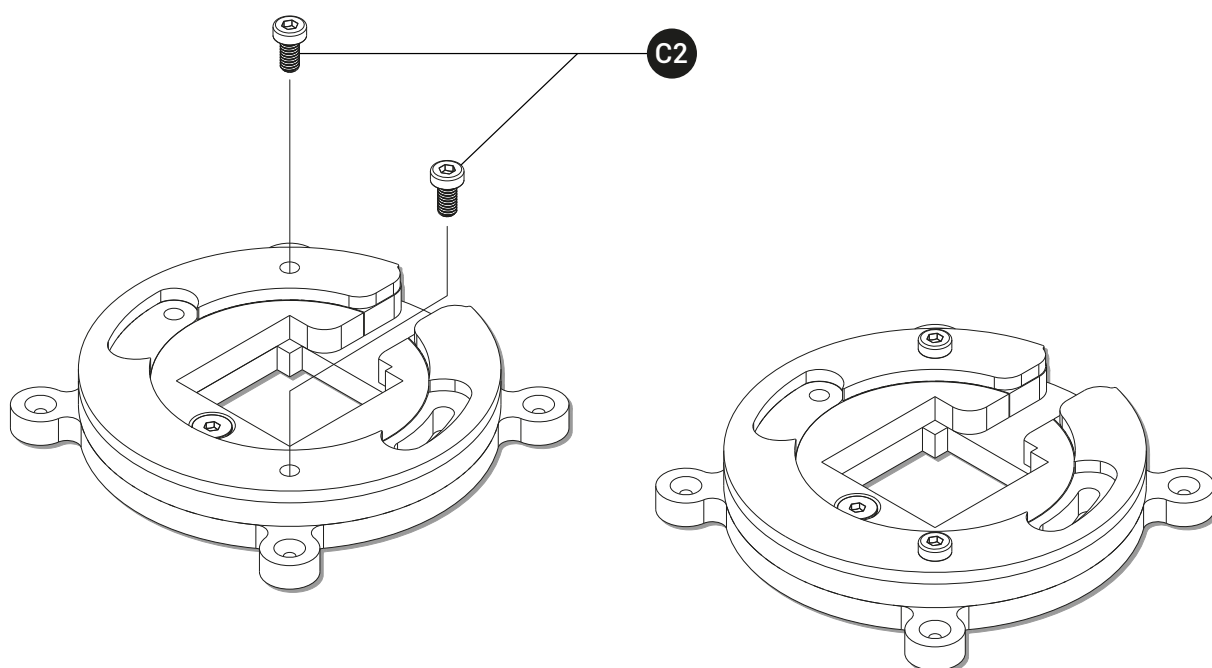
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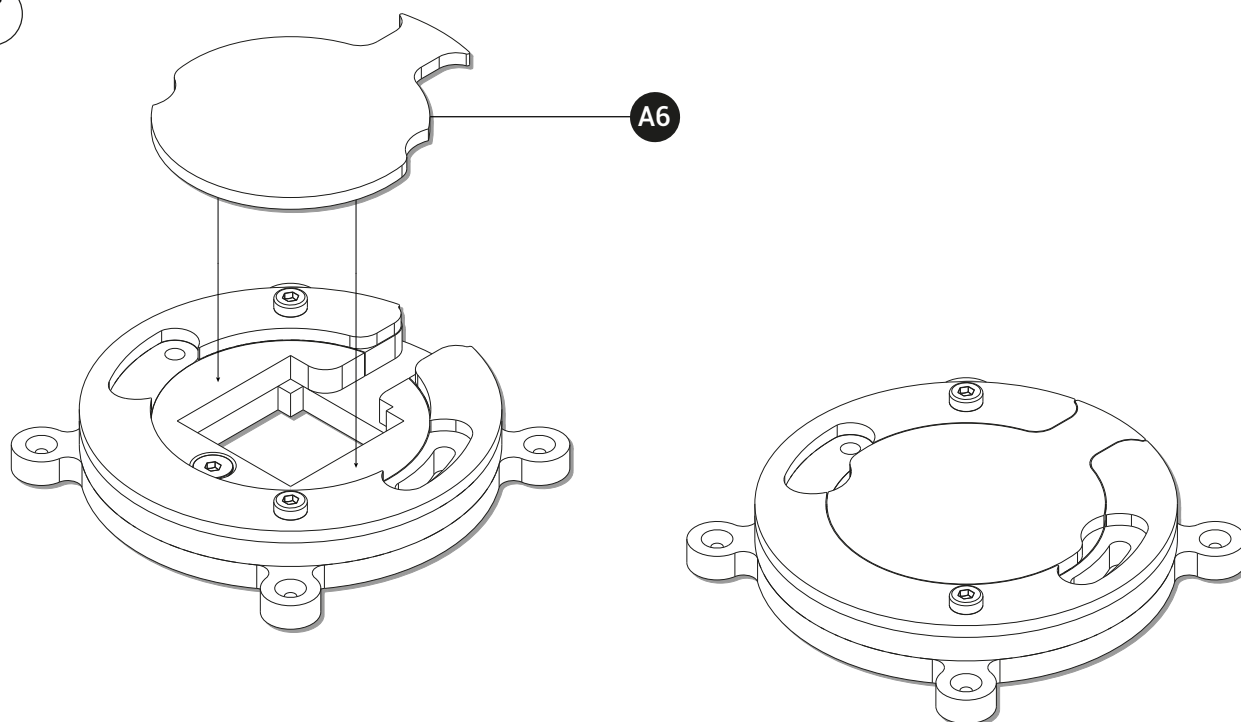
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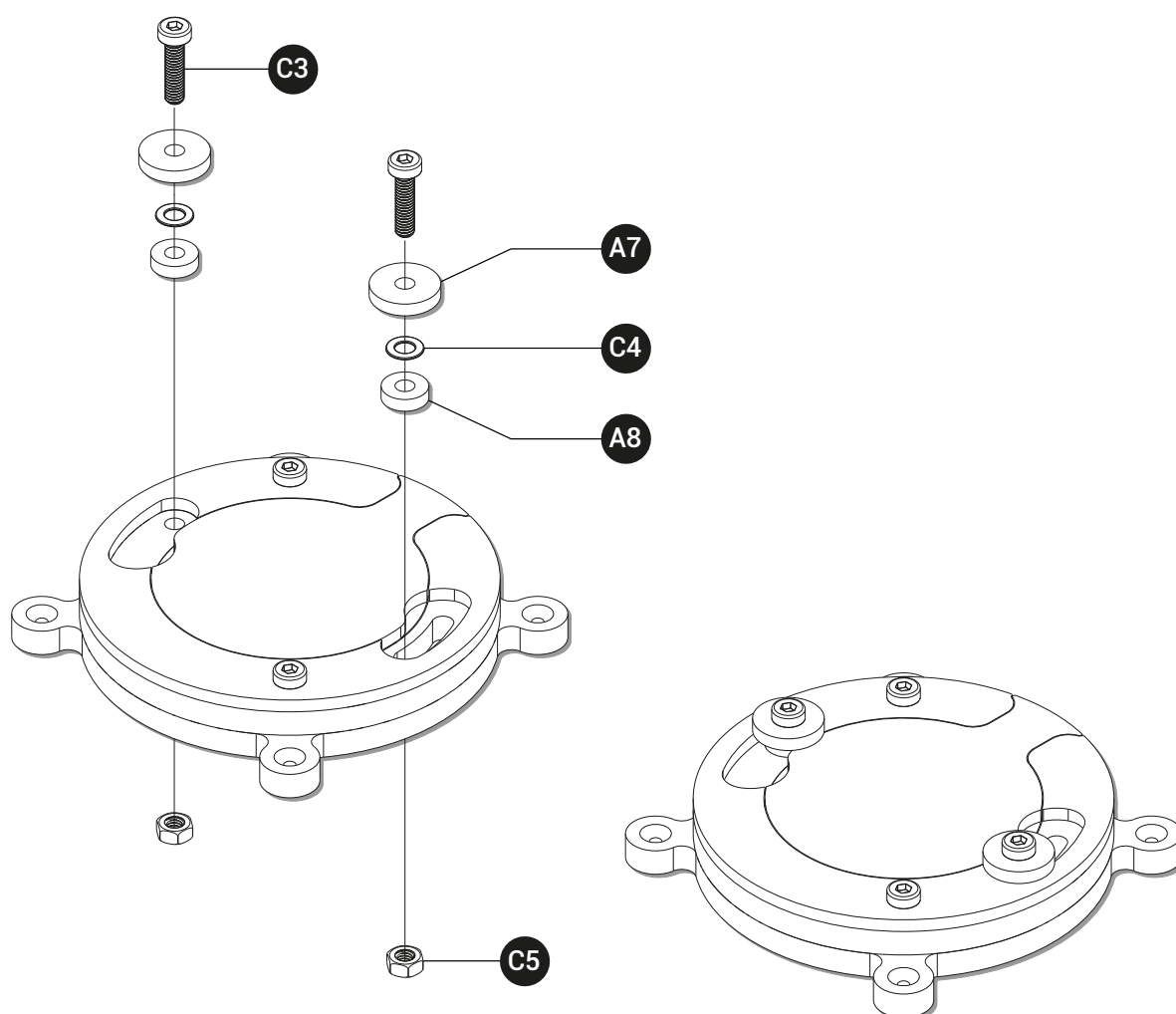
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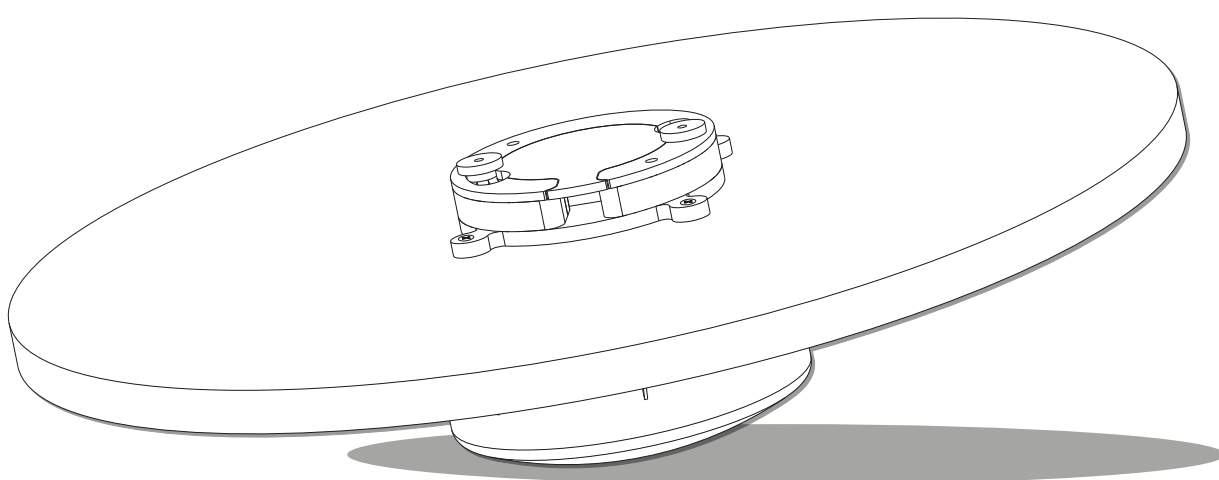
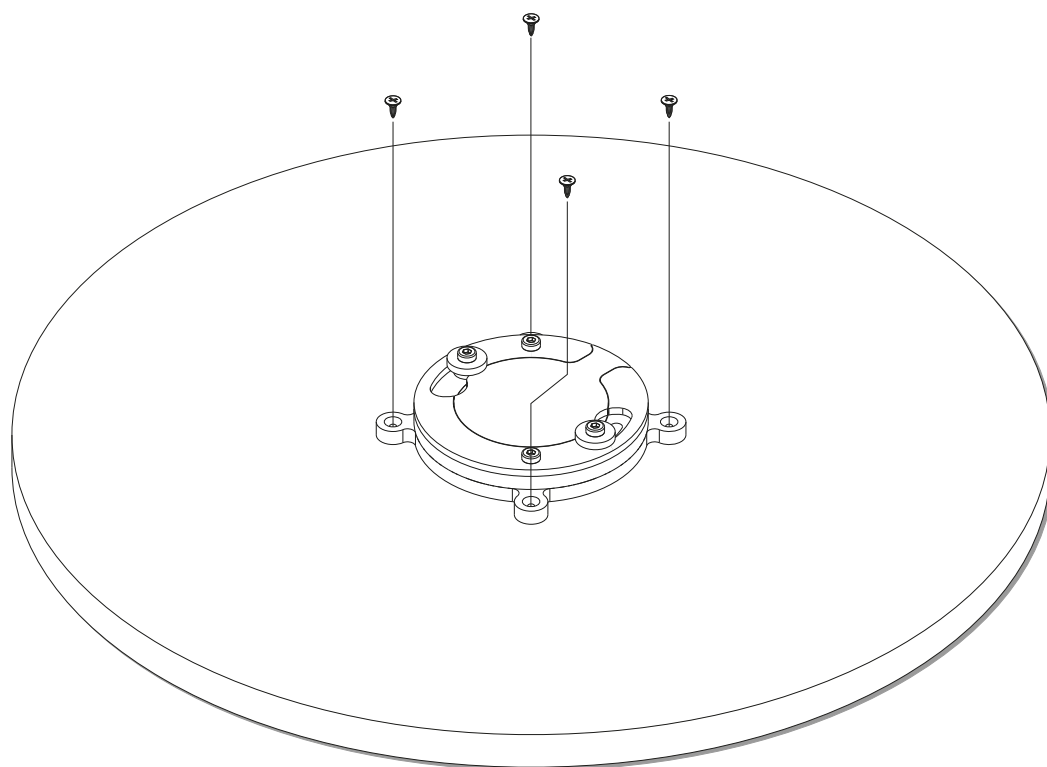
7



8



9



SET-UP

1 Download and install:



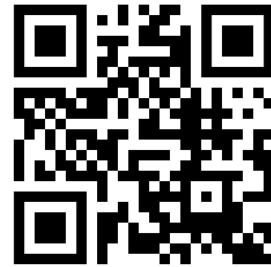
Movuina on www.movuino.com



PureData on www.puredata.info

Movuino

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



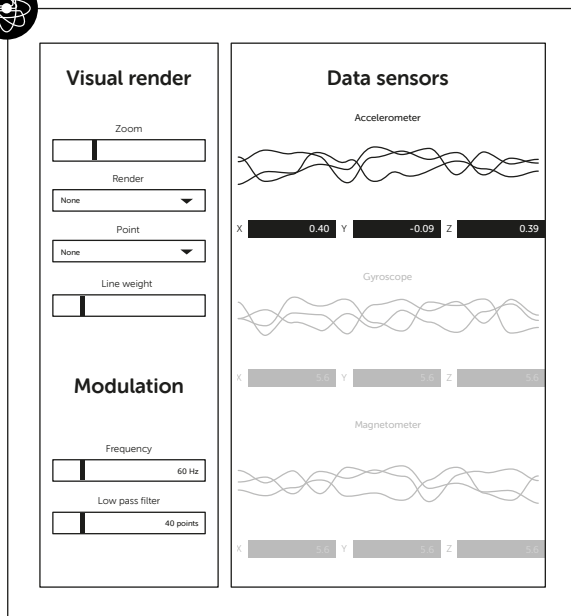
Launch **Movuina** and set-up by following the **Quick Start** tutorial

Quick Start

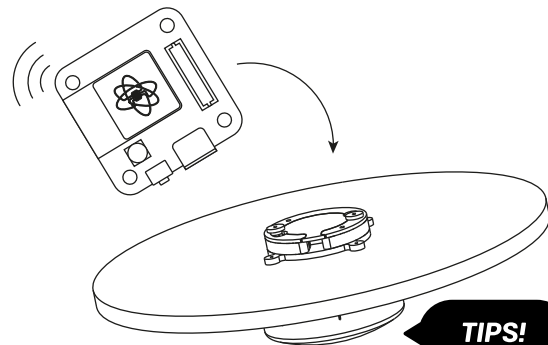
www.movuino.com/index.php/quick-start



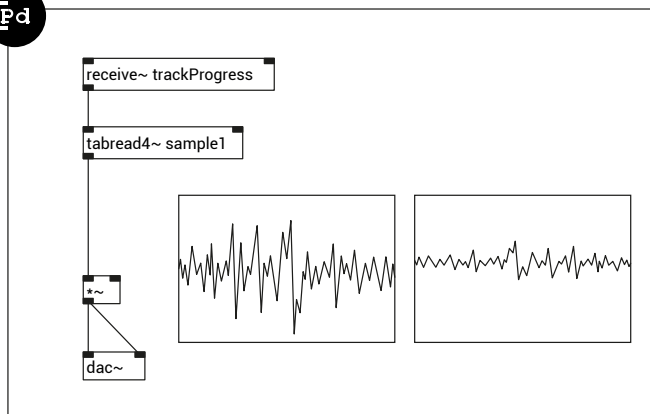
Once its done, you can directly receive the acceleration data sensed by the **Movuino** (or **Streamo**) into the **PureData** patch. There the data are processeced to generate sound modulations.



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

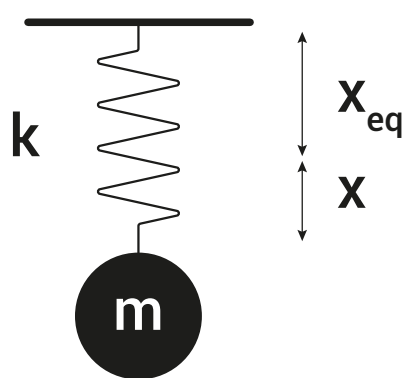


OSC message (127.0.0.1 port 3000)
/movuino or /streamo



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.



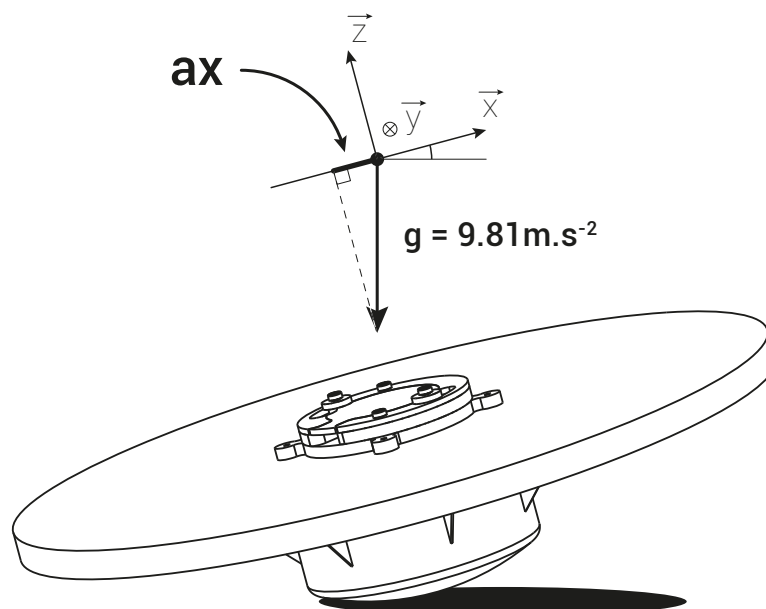
$$\frac{d^2\vec{x}}{dt^2} m = \sum \vec{F}_{ext}$$

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

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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