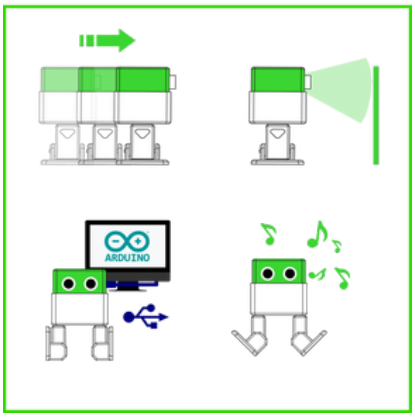
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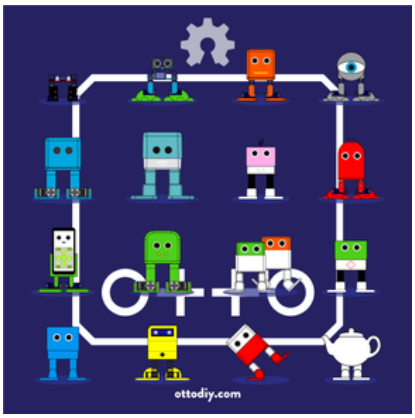
Otto DIY - Build Your Own Robot in One Hour!

Introduction: Otto DIY - Build Your Own Robot in O ne Hour!









Otto is an interactive robot that anyone can make!, Otto walks, dances, makes so unds and avoids obstacles.

Otto is completely open source, Arduino compatible, 3D printable, and with a soci al impact mission to create an inclusive environment for all kids.

Otto was inspired by another robot instructable BoB the BiPed and programmed u sing code from another open source biped robot called Zowi.

Otto's differences are in the assembled size (12cm x 7cm x12cm), cleaner integrat ion of components and expressions. Using off the shelf and 3D printed parts, simp le electronics connections (almost no welding required), and basic coding skills, y ou will be able to build your own cute Otto friend in as little as one hour!

Otto is design using Autodesk 123D Design initially and now is owned by Tinkerca d software you can modify it for customization or further improvements!

This instructable focuses on how to build the basic **Otto DIY version, check the other similar robots in our website** and welcome to participate in our #OttoREM IXchallenge

Step 1: List of Parts



Gather all the off the shelf parts that you'll need for this assembly. Here's the list:

1. Nano ATmega328

2. Nano Shield I/O

3. Mini USB cable.

4. Ultrasonic sensor HC-SR04

5. Mini servo SG90 9g x4 (each one should come with 2 M2 pointed screws and o ne small screw).

6. 5V Buzzer

7. Dupont F/F cable connectors 10cm **x6.**

8. 4 AA Battery case stacked with switch soldered

9. AA alkaline batteries **x4. 1.5V each**

10. Mini cross screwdriver. it is important to be magnetized you will se why ;)

And then you only need to 3D print 6 parts in total:

11. 3D printed head.

12. 3D printed body.

13. 3D printed leg **x2.**

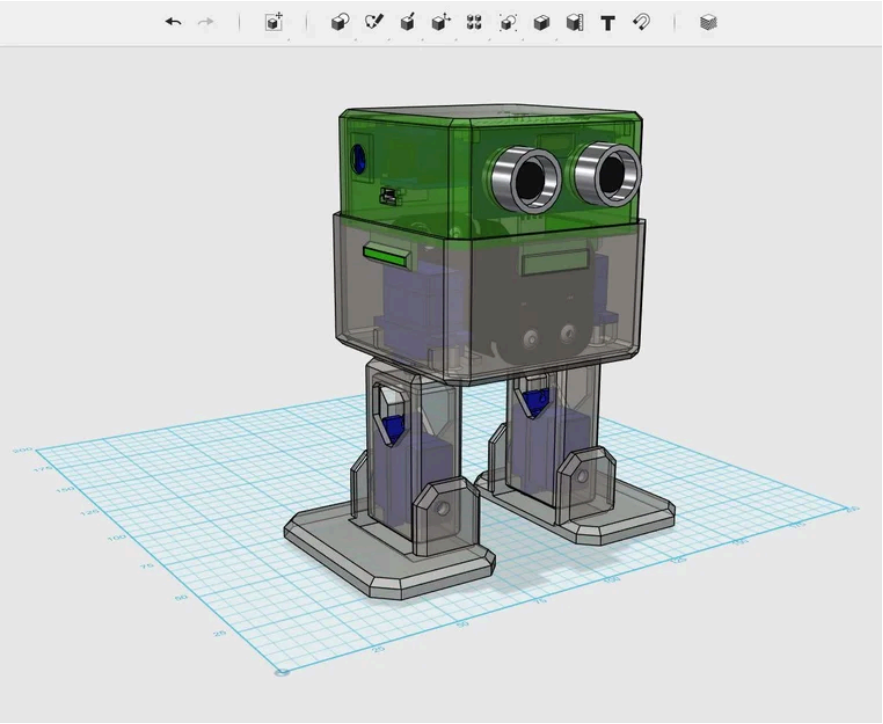
14. 3D printed foot x2.

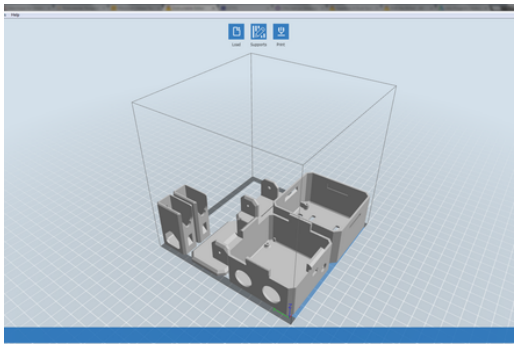
Optional: cutter for post cleaning the 3D parts (if the 3D print quality is good enoug h no need) and a soldering iron (if you want it battery power otherwise you can still connect it through USB to energize)

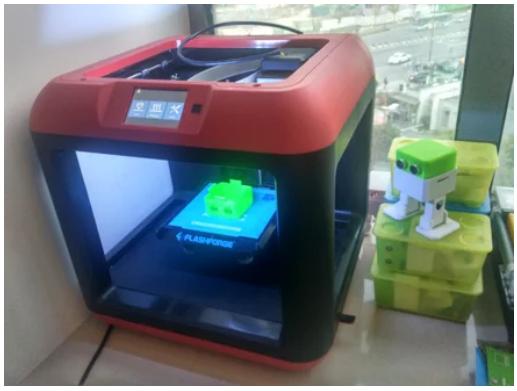
That's all simple!; If you do not have a 3D printer you can always use services or l ocal maker spaces.

If you think is difficult to find the parts, you can buy the full kit here! and follow this video of how to build:

Step 2: 3D Print Settings







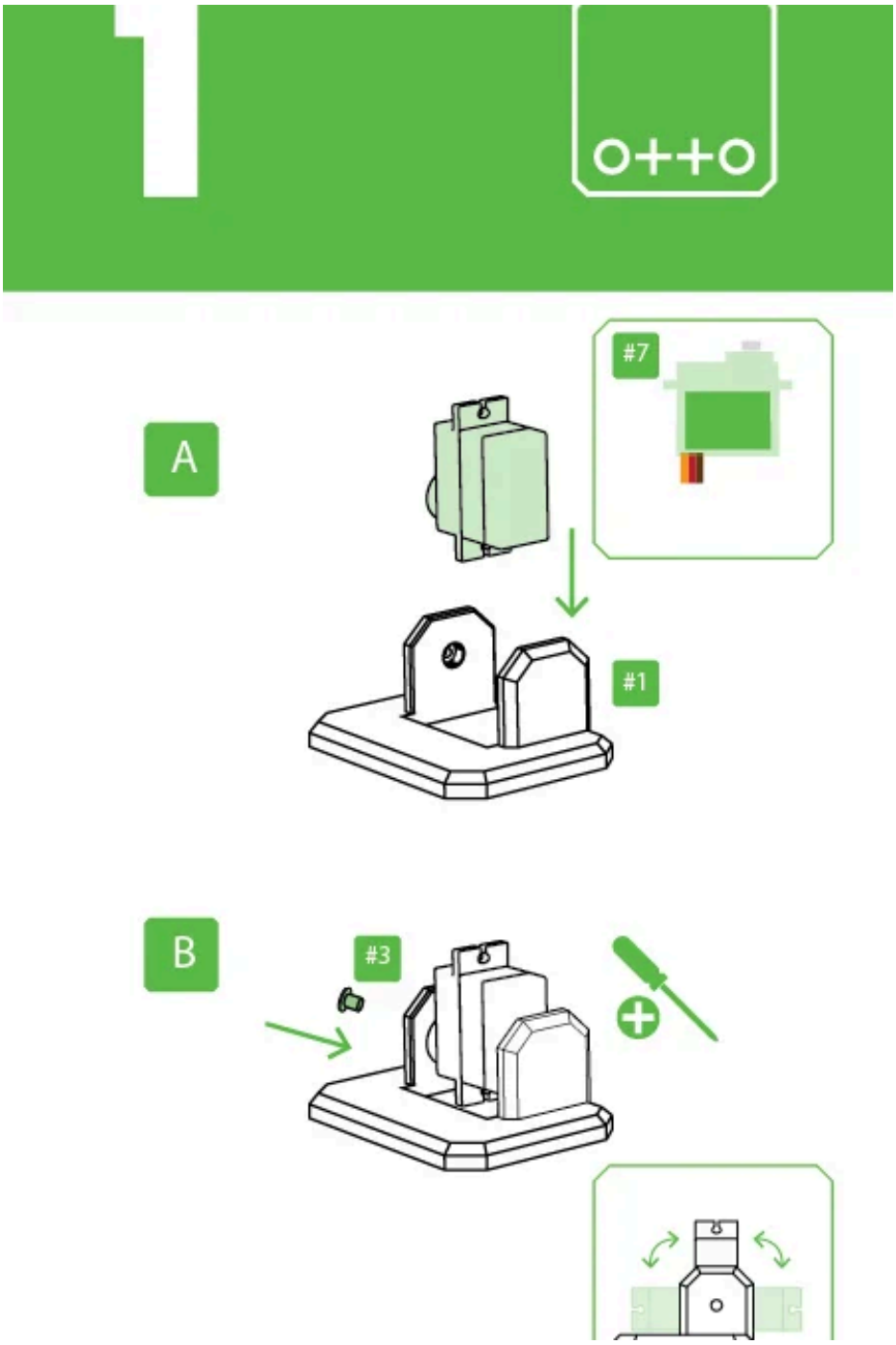
Otto is very well designed for 3D printing, the files that you had downloaded are pr operty oriented and centered, so wont give you trouble if you follow this common p arameters:

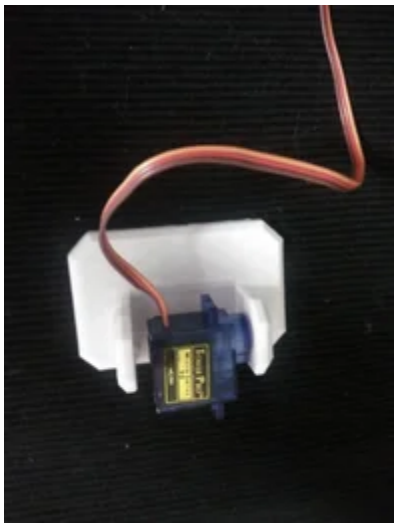
- Recommended to use a FDM 3D printer with PLA material.
- No need supports or rafts at all.
- Resolution: 0.28mm
- Fill density 15%

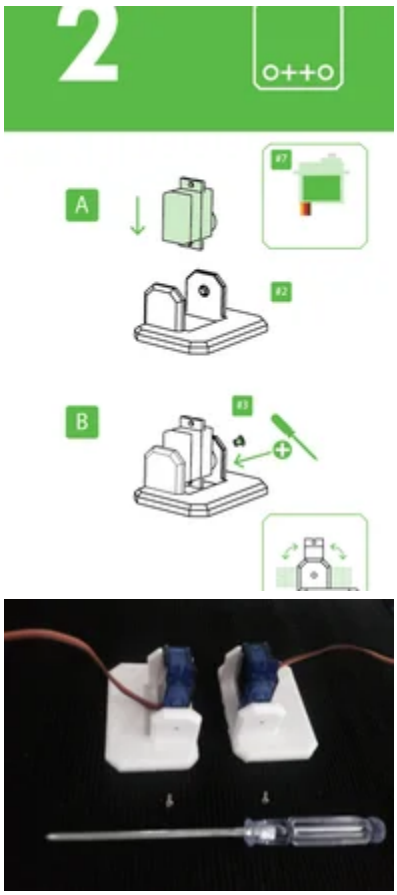
For slicing and generating the g code for the machine free **slicer software** like Pr usa Slicer(If you are outsourcing the printing no need to worry about it)

After printing you will need to clean a little bit the legs and feet areas that fix the m otors.

Step 3: Foot Servos Assembly







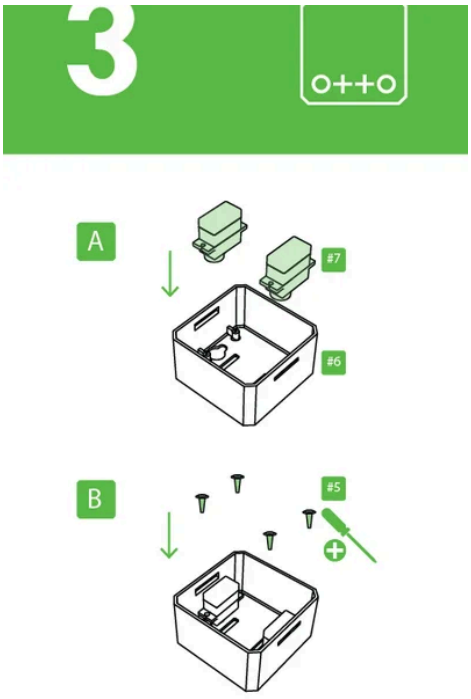
Put the micro servo inside feet and then push it inside, if is to hard maybe need to clean more the area with a cutter.

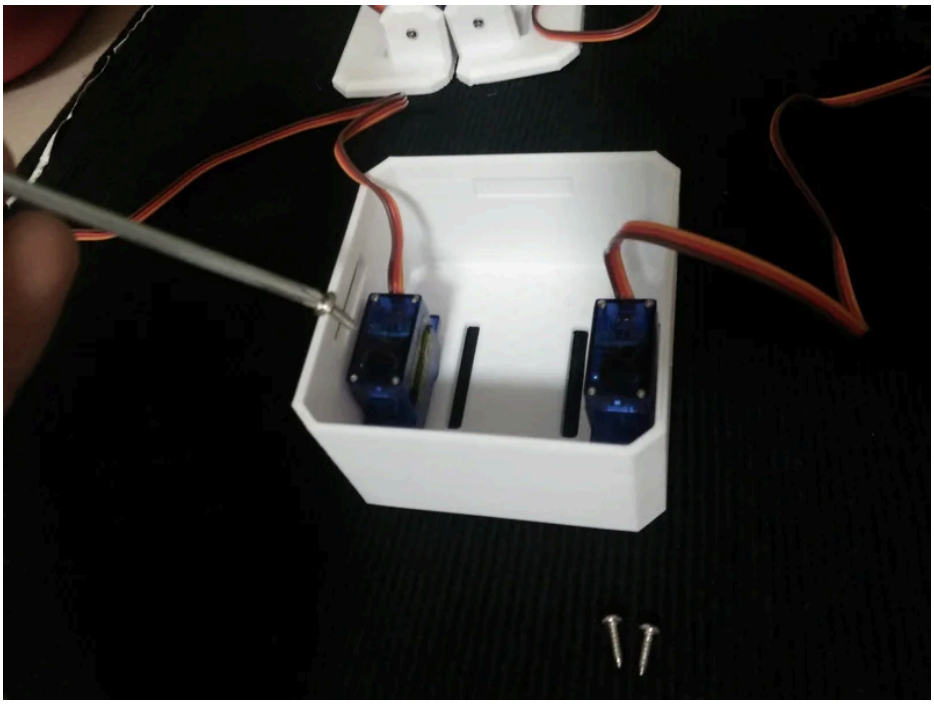
Is very important to check that the servo is able to rotate at least 90 degrees to ea ch side.

After checking the movement use only the small screw to fix it.

Same process for the other foot.

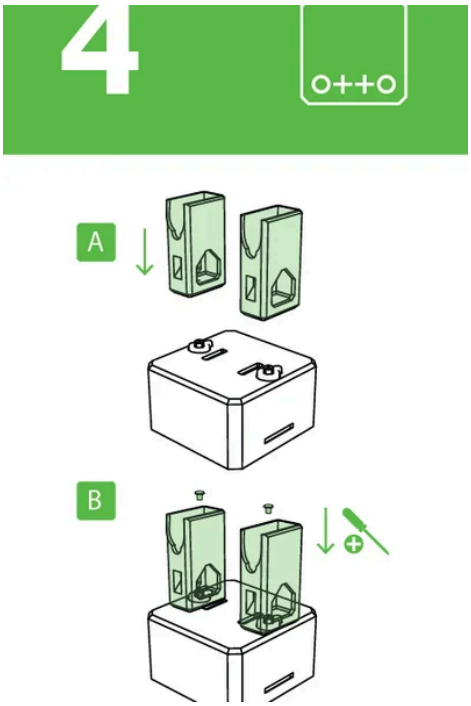
Step 4: Fix Servos to Body

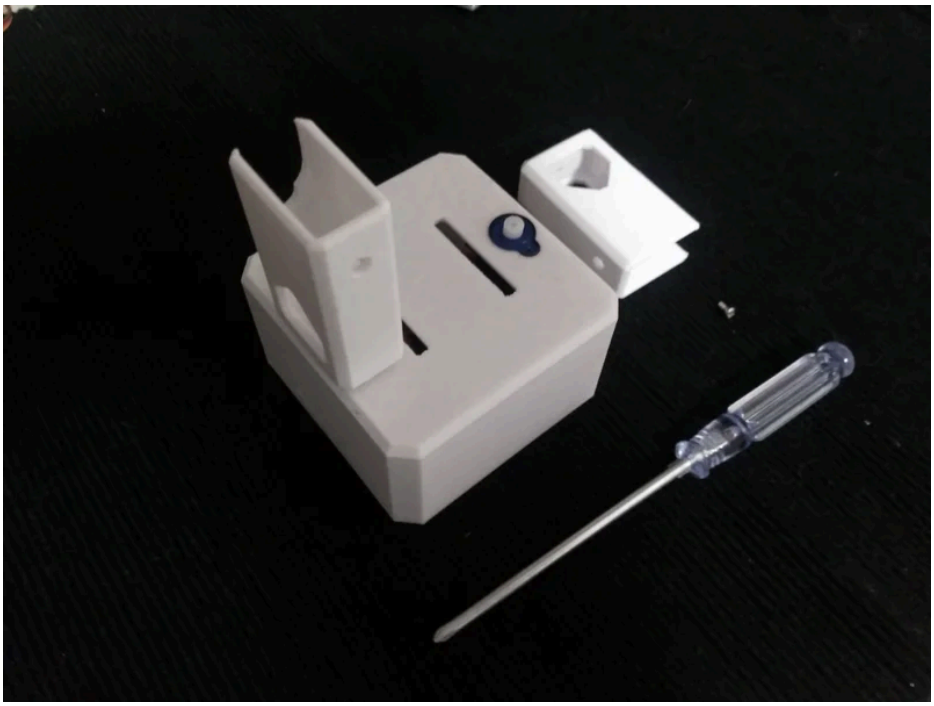




Take the other 2 micro servos put them in the defined locations in the 3D printed b ody and fix them only with the pointed screws.

Step 5: Fix Legs to Body

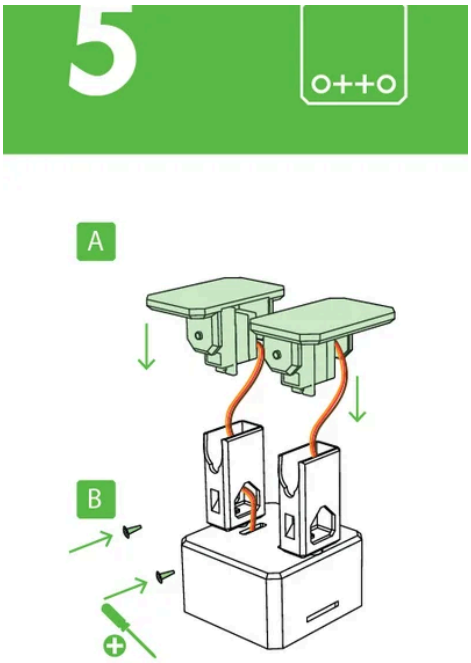




Connect the legs to the hub of the micro servo, important like the foot servos you must check the legs are able to rotate 90 degrees each side respect to the body.

After verifying the alignment fix them using the small screws to the hole inside the leg.

Step 6: Fix Foot to Legs





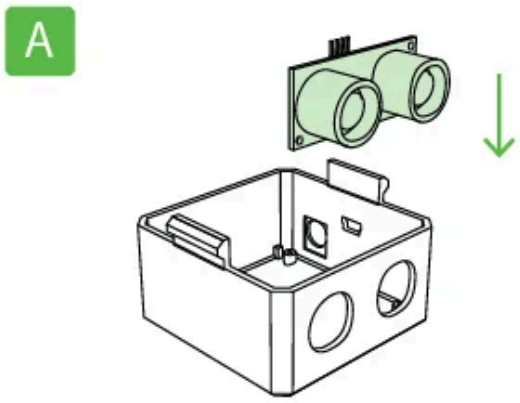
Taking care of the cables as showed in the illustration you should put the cables in side the slots of the body passing thought the hole of the legs.

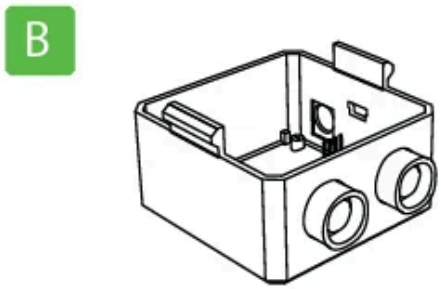
Once they are in right position use the pointed screws to fix them from the back.

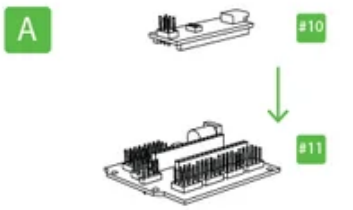
Step 7: Head Assembly

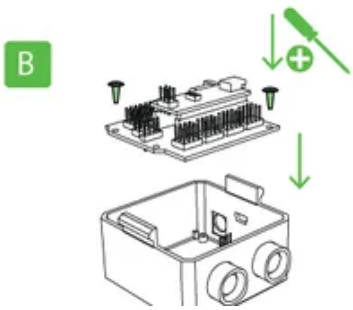


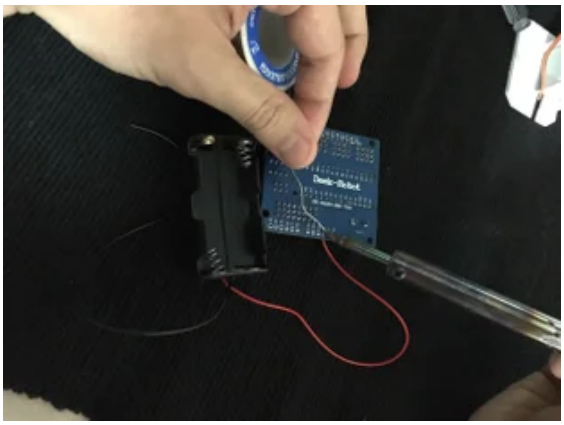


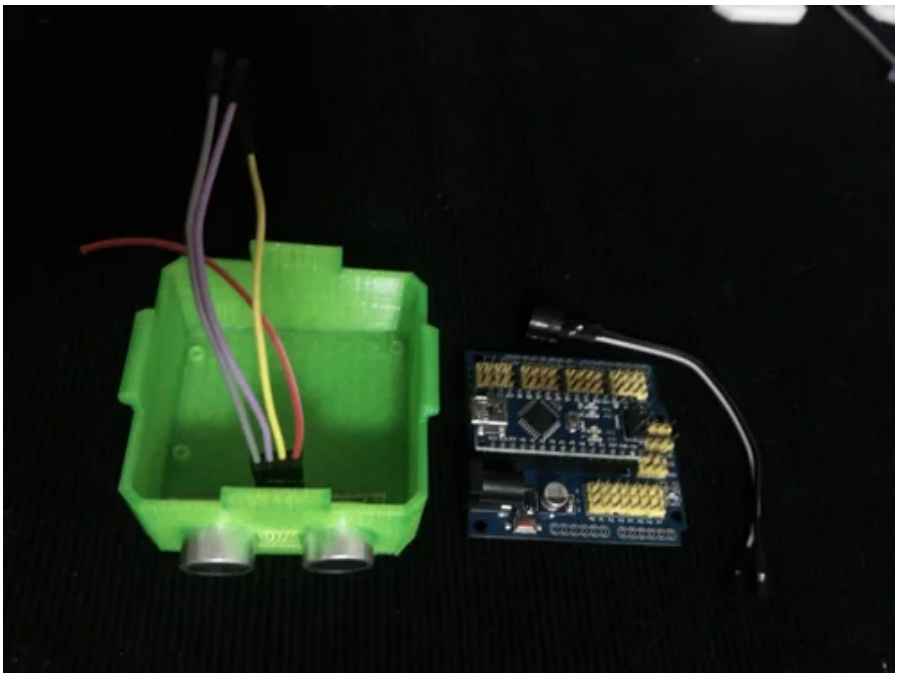












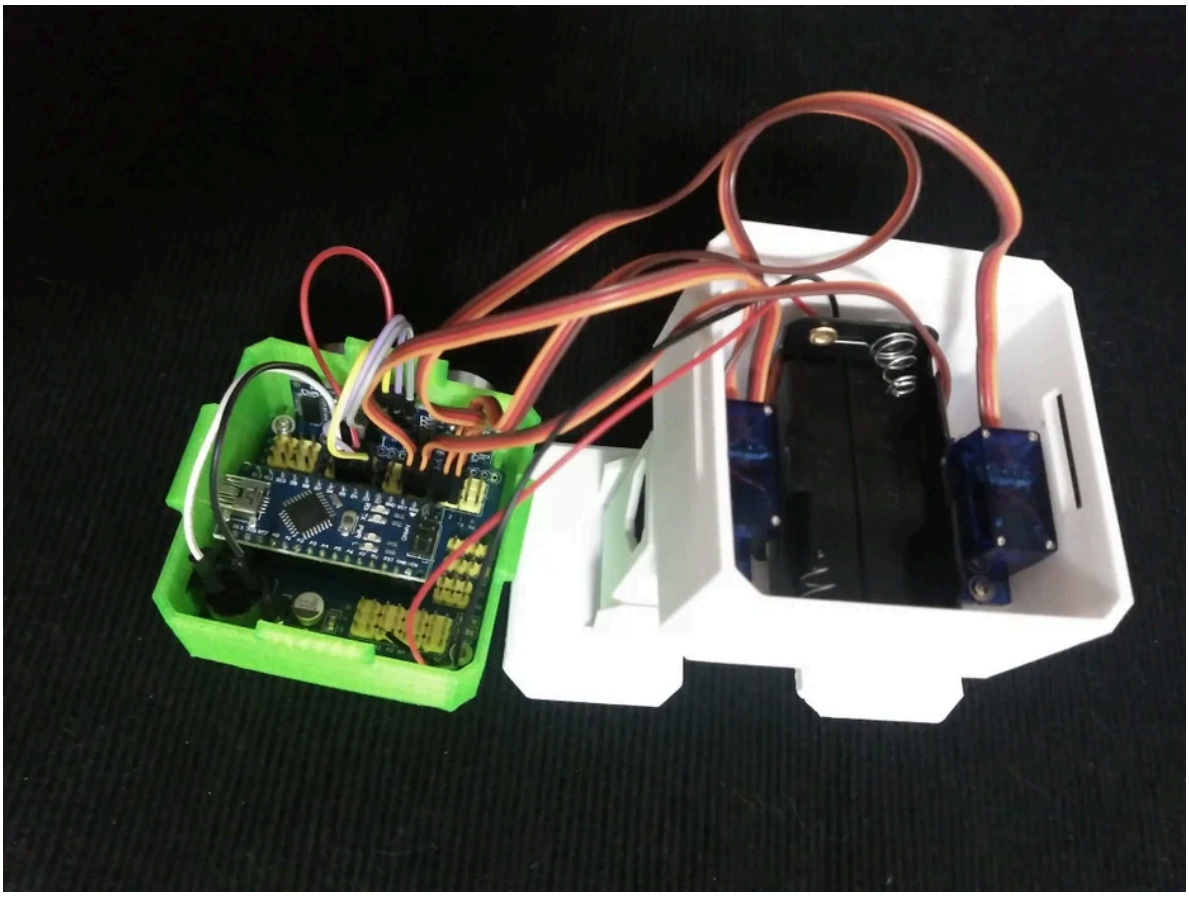


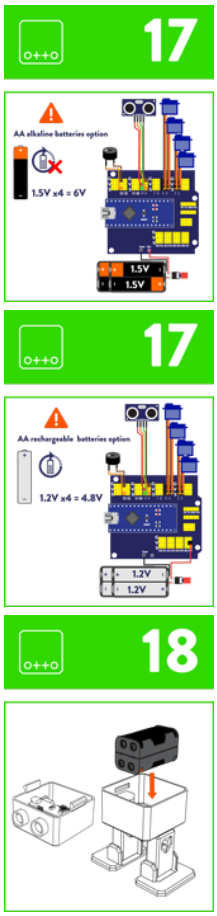
Start from the ultrasound sensor is important to pull out the eyes to the limit.

After putting the Arduino nano in the shield, optionally you can weld the battery hol der positive cable to Vin in the board and negative to any GND.

Insert diagonally the both boards together facing the USB conector to the hole in t he 3D printed head, then use the last 2 pointed screws to fix it.

Step 8: Electric Connection (Wiring)





Prepare the shield, cables and buzzer.

Then follow the diagram pins numbers and make sure to put them in the right posi tion.

You have at least 4 option to power your Otto:

1. 4xAA alkaline batteries (1.5V each) that connected in series go to Vin pin and G nd

2. 4xAA rechargeable batteries (1.2V each) that connected in series go to 5V pin a nd Gnd

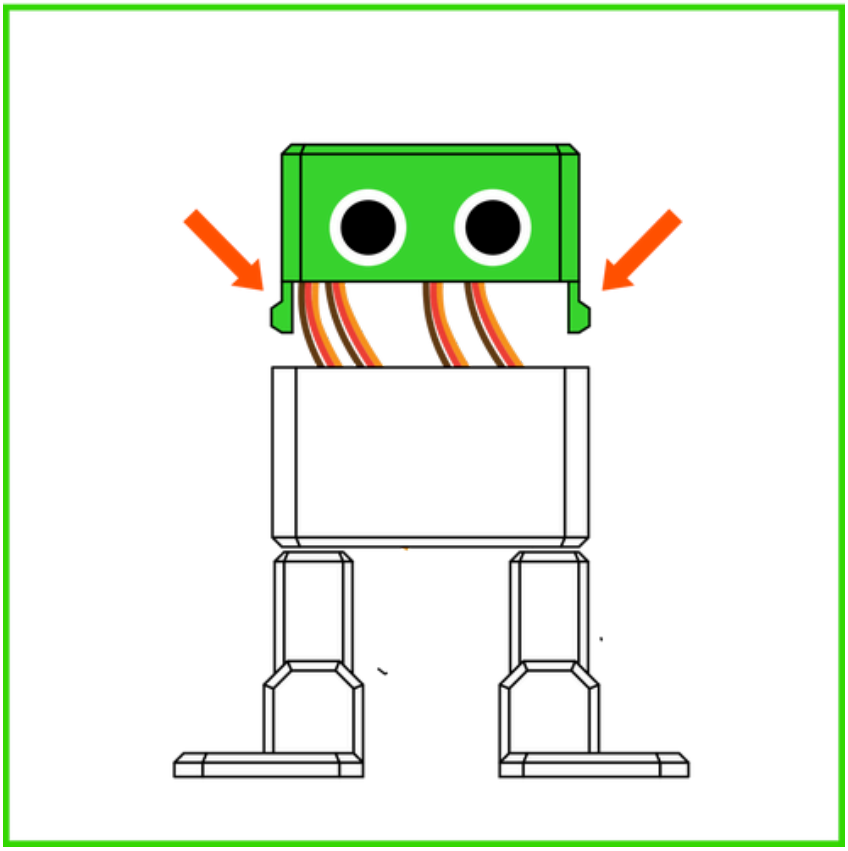
3. Just directly from USB cable to your computer or even a power bank

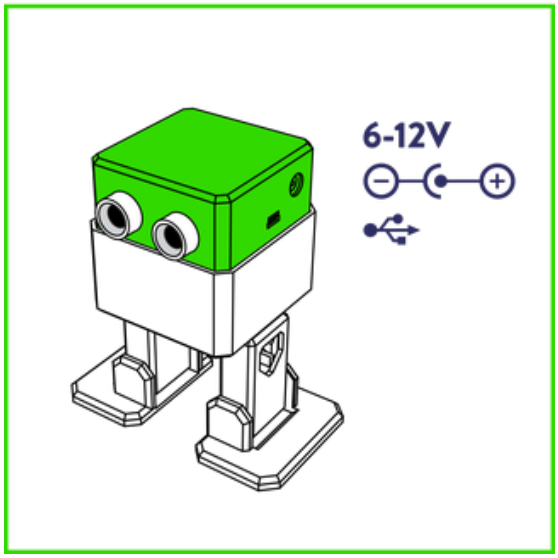
4. External jack connector to use power adapters from 6V up to 12V output

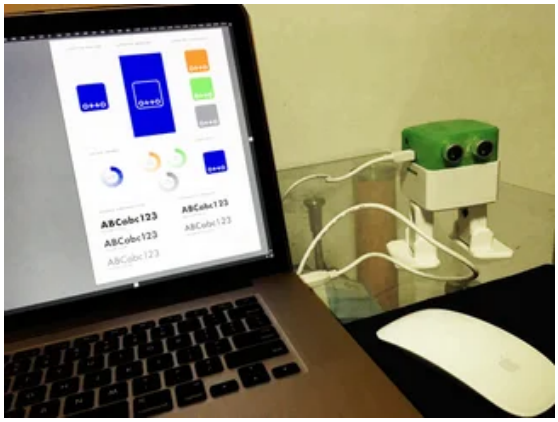
Step 9: Snap the Head and Upload the Code











The head just snaps in, take care of the cables and close it.

For the coding part you will need to install Otto Blockly and just upload any examp le

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