

Otto DIY

Otto is truly Opensource; it means the hardware is easily discerned so that others can make it, Arduino compatible, 3D printable and customizable, the perfect opportunity to build and have your very first robot, learn robotics and have fun.

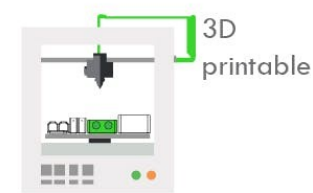
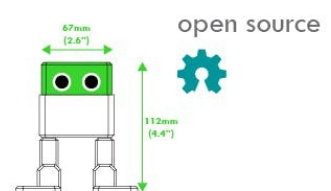
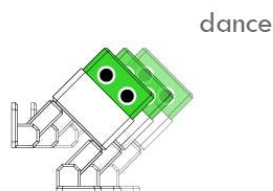
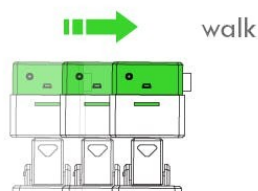
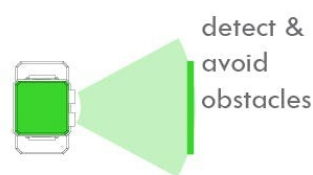
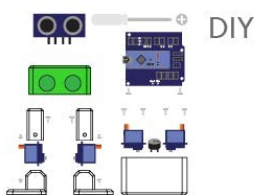
Otto is more than just a robot toy; the act of building and coding your own Otto will create an emotional attachment between you and him. It will bring children and people closer to technology, since the builders will learn the logical connection between code and action, and by assembling it they will understand how its components and electronics work.

In short, it is the ideal companion for developing STEAM skills: by building it, children exercise mathematical thinking, reinforce their technological and physical knowledge and enhance abilities such as problem solving and creativity. Through play and experimentation, children can learn about a technological product in a fun and educational way.

Thanks to [Zowi](#) for the code, [BoB the BiPed](#) for the inspiration, and [Rafael Lopez](#) for the servo calibration tools.

Functionalities

Otto walks, dances, makes sounds and avoids obstacles.



Bill of materials

Here there is a list of the materials you will need to build Otto.

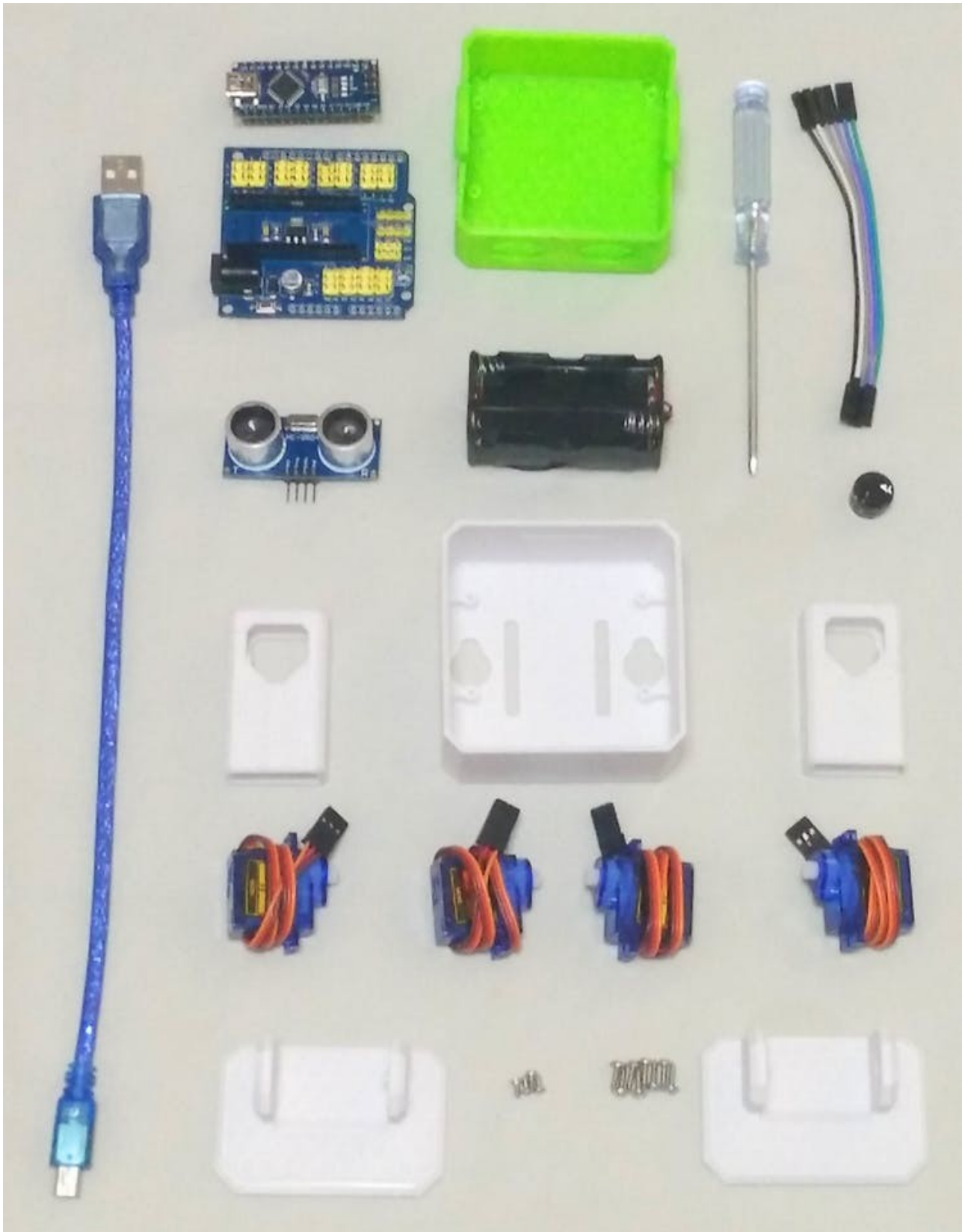
- 1x Arduino NANO Shield I/O
- 1x USB-A to Mini-USB Cable
- 1x HC-SR04 Ultrasound sensor
- 4x Micro servo SG90 9g
- 1x Buzzer
- 6x Female/Female Jumper Wires
- 1x 4xAA battery holder (stack 2X 4AA Battery)
- 1x 8x8mm Micro Switch Self lock On/Off
- 6x Otto DIY 3d printed parts

Preparing for assembly

Gather all the off the shelf hardware parts that you'll need for this assembly. Then you only need to 3D print 6 parts in total:

- 3D printed head
- 3D printed body
- 3D printed leg (x2)
- 3D printed foot (x2)

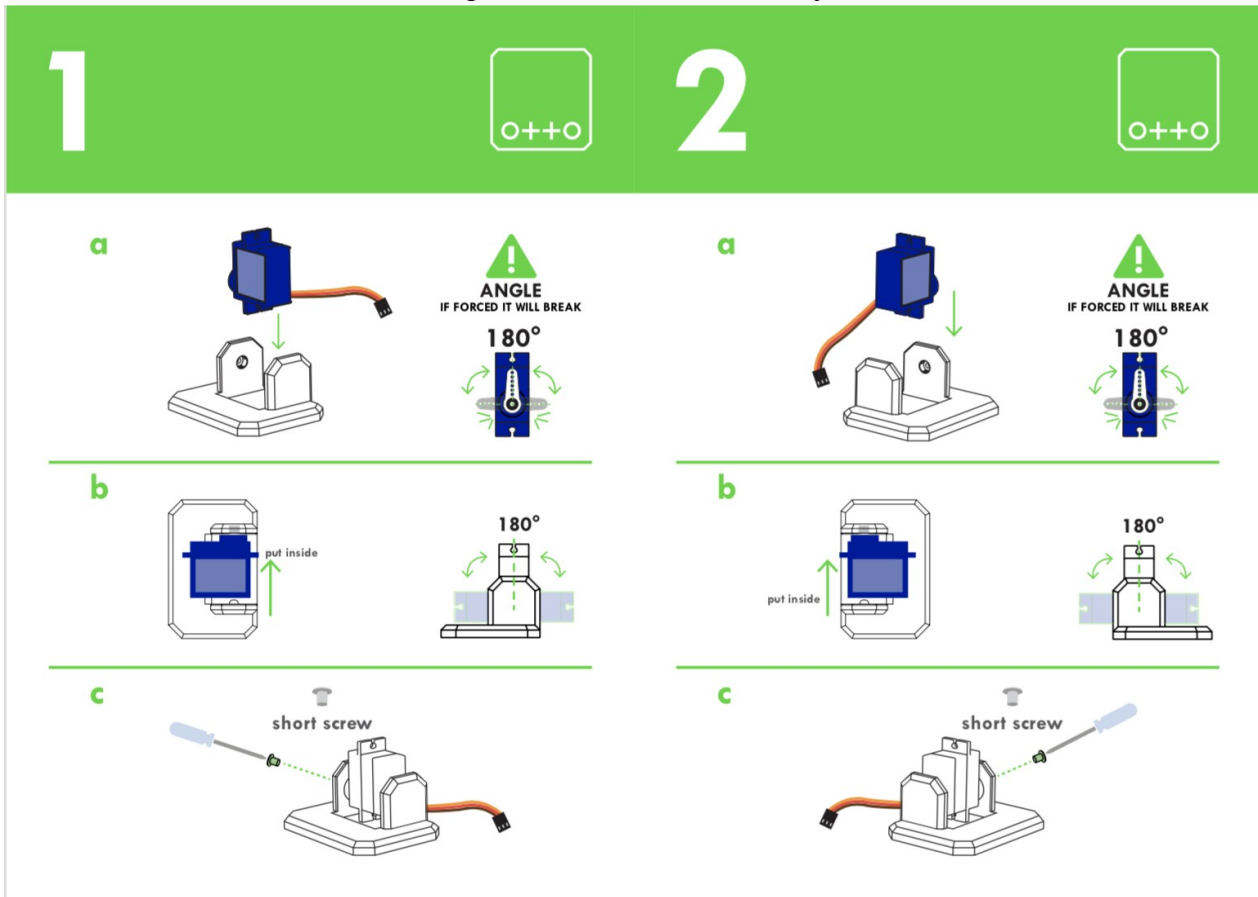
Check the [3D printed files folder](#) for instructions on how to do this.



Before getting started with the assembly, feel free to download the PDF guide from the Others folder.

Foot servo assembly

Put the micro servo inside feet and then push it inside; if it is too hard, clean more the area with a cutter. It is very important to check that the servo is able to rotate at least 90 degrees towards each side. After checking the movement, use only the small screw to fix it.

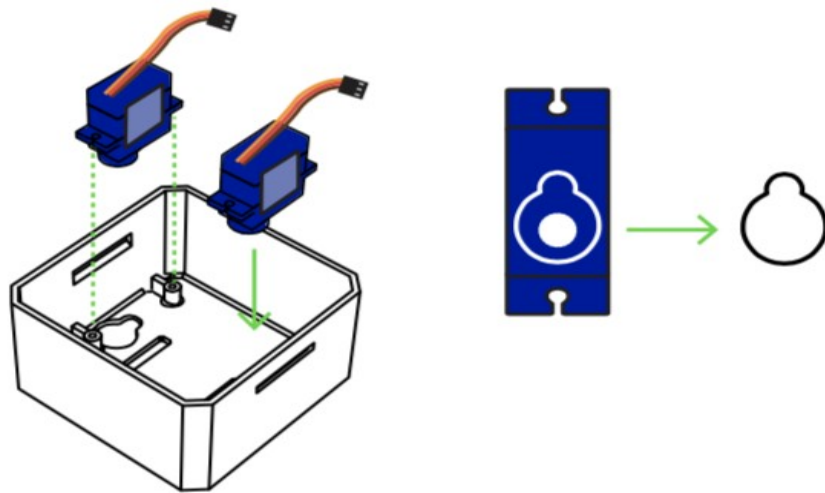


Fix servos to the main body

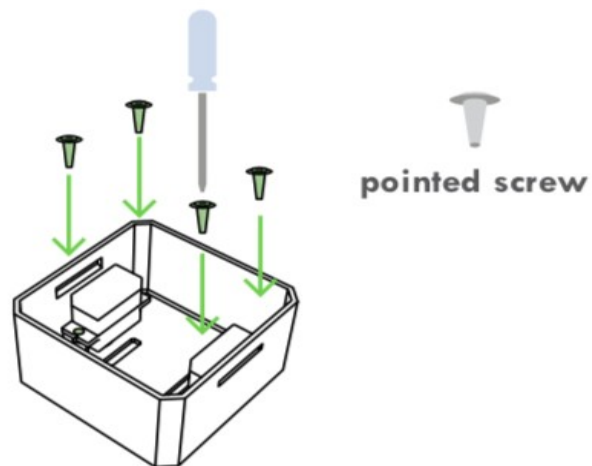
Take the other 2 micro servos put them in the defined locations in the 3D printed body and fix them only with the pointed screws.



a



b



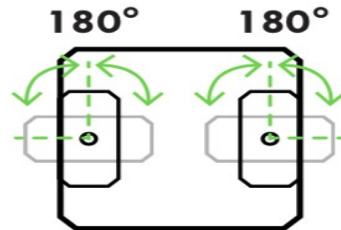
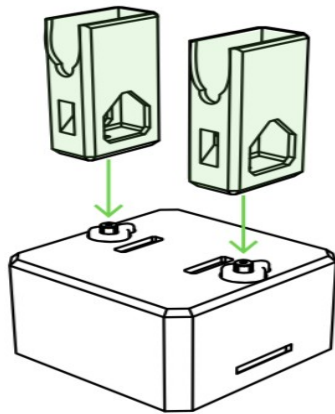
Fix legs to the main body

Connect the legs to the hub of the micro servo. It is important to check if the legs are able to rotate 90 degrees towards each side with respect to the body. Refer to the guide below for an indication on how it should work:

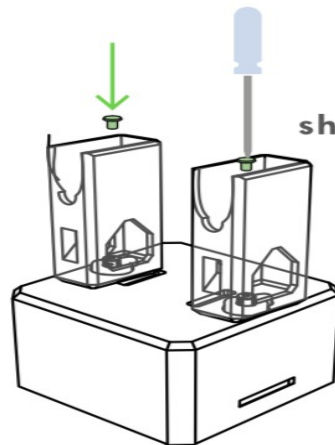
4



a

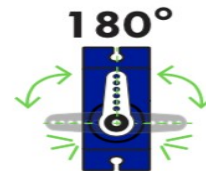


b



short screw

!
ANGLE
IF FORCED IT WILL BREAK



After verifying the alignment, fix them to the servo using the small screws.

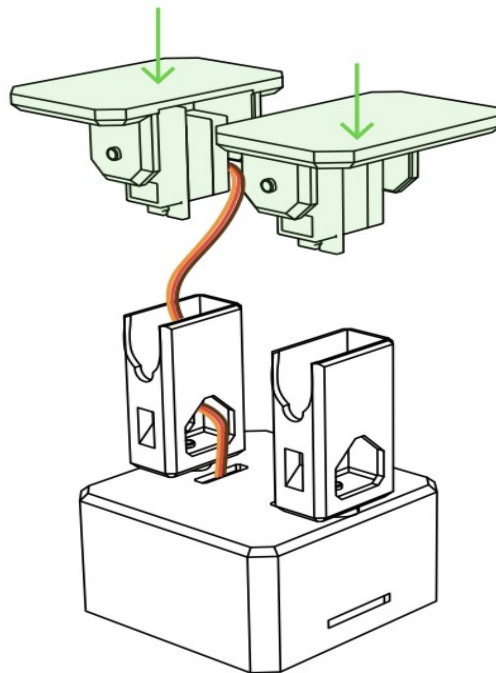
Fix feet to the legs

Take care of the cables by fixing the feet as showed in the illustration. The cables will go inside the slots of the body, passing first through the hole of the legs.

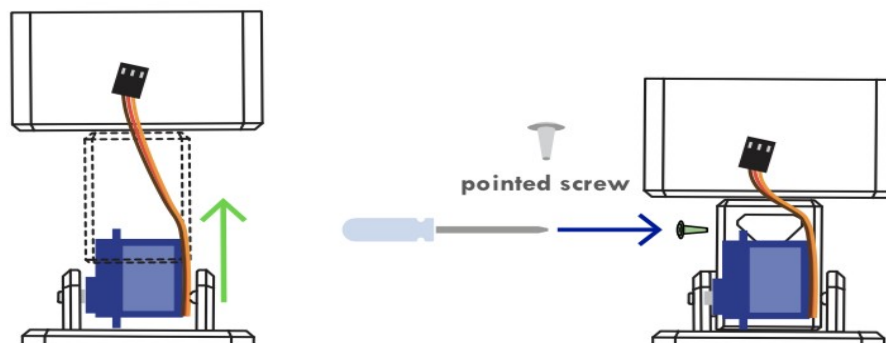
5



a



b



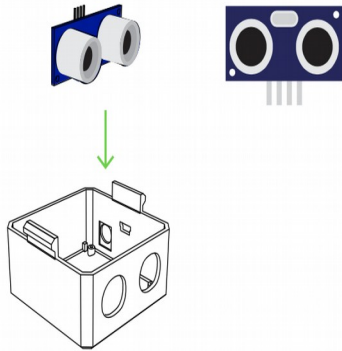
Once they are in right position use the pointed screws to fix them from the back.

Head assembly

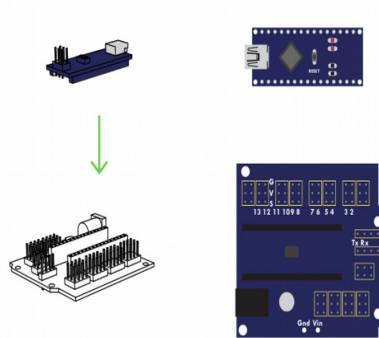
Starting with the ultrasound sensor, it is important to push it as close to the edge of the head as much as you can. This means that the "eyes" should be protruding as much as possible. After putting together the arduino and the shield, you should insert both boards diagonally making sure the USB connector is aligned with the hole in the 3D printed head, then use the last 2 pointed screws to fix it.



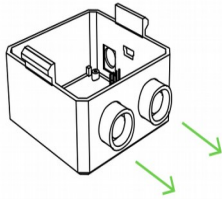
a



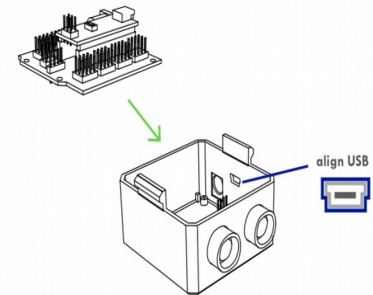
a



b



b



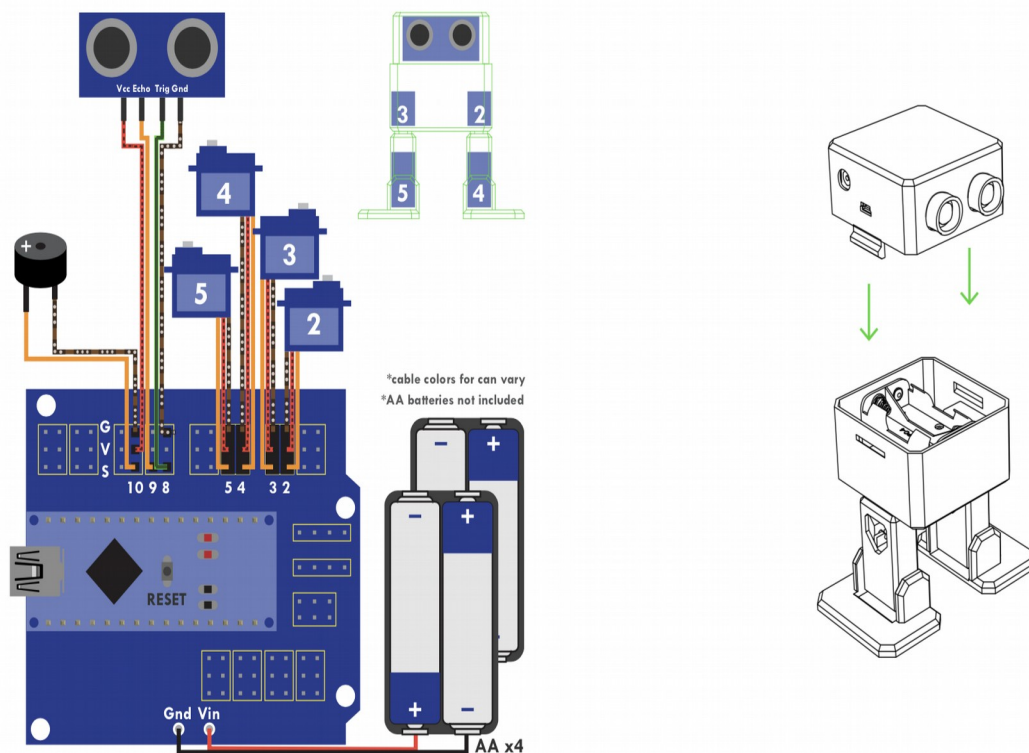
Electric connections

You can weld the battery holder positive cable to Vin in the board and negative to any GND, nonetheless, you should check the circuits with the USB cable before inserting the AA batteries. Prepare the breadboard cables and buzzer, then follow the diagram pins numbers and make sure to put them in the right position. Check [this diagram](#) to make sure the connections are done correctly

10



11



Software

Once the head is snapped in, prepare to upload the code.

1. Download & install the [Arduino software](#)
2. Copy the [Oscillator libraries](#) to C:\\Users\\user\\Documents\\Arduino\\libraries (or wherever your library folder is installed)
3. Connect your Otto through USB (your computer should install the drivers)

4. Finally open & upload any of the Arduino sketches available under the [software folder](#) to your Arduino Nano
5. Otto is ready to dance!