



by +OttoDIY

Overview

Files

Issues



A Laser cut chassis for [+OttoDIY](#) robot. [Fun to assemble with our Builder Kit](#) includes [boxe.py](#) a software to customize and change the size & thickness parameters, made by Backspace



Production

Last activity

4 Jan 2021 ●

Contributions

30

Views

1032

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documentation: ✓ 100%    level: ☆☆☆☆☆    ⌚ 5 hours    version: 10    💰 [buy](#)\*\*\*\*

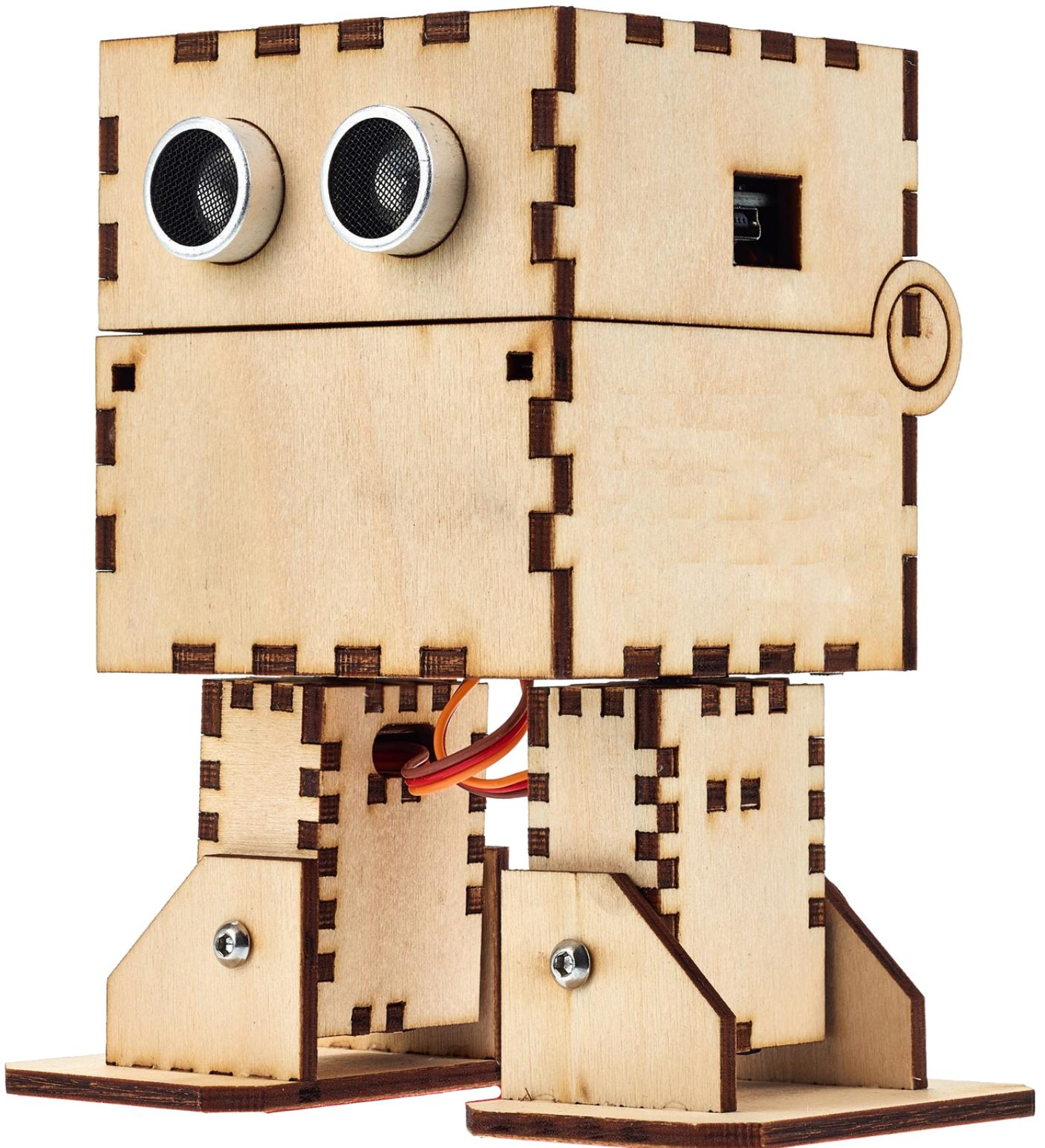
[instruction manual](#)    [code with blockly](#)    [control with app](#)    [2D files](#)    [papercraft](#)    [download all](#)

### Background information:

Otto LC is a chassis for the Otto DIY robot that can be made using a laser cutter (though the LC). It is primarily intended to be cut from plywood but could also be made from other materials (may be with a bit of tweaking). In addition to the features of the original chassis it also allows mounting a mode switch for looping through different programs.

Visit [www.ottodiy.com](http://www.ottodiy.com) for more detailed info.

### Build Your Own Robot





## How it Works

We wanted to do a robot project for children and found Otto DIY here on Wikifactory. While it is a very nice project it uses a 3D printed chassis. While 3D printing is really cool for building one robot it just takes too long for 20 robots. As the chassis is basically made of 3 blocks plus the feet it was a natural step to recreate it in Boxes.py a software to create boxes on a laser cutter.

If cut with sufficient burn correction (aka kerf) most pieces can be put together without glue (but with significant force). This is nice for one robot but turned out to be not very practical for children who often lack the strength (unless you want to hand them a mallet).

Besides the servos and the electronics only two little screws are needed in addition to the laser cut parts.

Otto DIY Laser cut robot dancing electronics music.



## Part List

Otto DIY can be made with [our Builder Kit LC \(full with laser cut parts\)](#) and [Maker Kit \(only electronics\)](#) or create your own project with this open source content.

- 1x Nano ATmega328
- 1x Nano Shield I/O
- 1x USB-A to Mini-USB Cable
- 1x [Bluetooth module BLE](#)
- 4 xScrews M3x6mm
- 1x Ultrasound sensor. HC-SR04
- 4x servo SG90 9g
- 1x Buzzer.
- 6x Dupont cables F/F 10cm
- **Make it [rechargeable and better performance with this power boost module\\*\\*\\*\\*](#)**
- Desired material sheet 20x30cm of 2.8mm thick, it works with basically any wood material but you could try acrylic, cardboard and other flat sheet materials.



- Glue
- sand paper helps to clean the edges before assembling

## Laser Cut

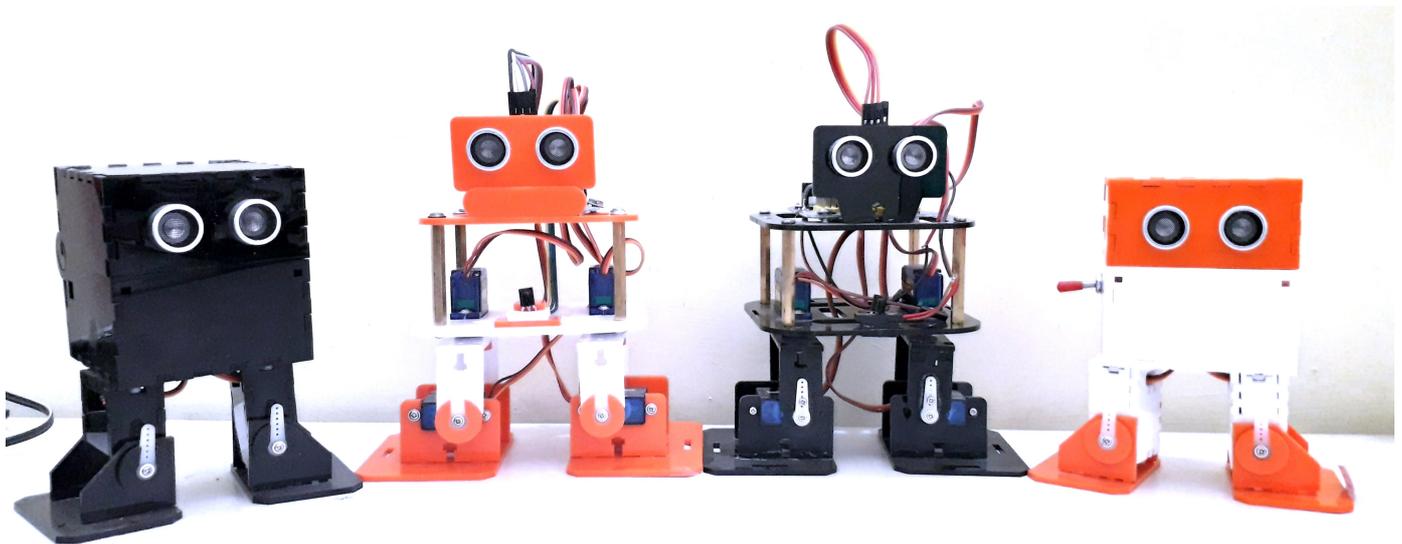
You will need a Laser cut machine or someone that provides you the service and send the specific format that the machine will use for example .ai .pdf .dmg or .ai

While Boxes.py allows setting any thickness this is really meant to be cut in 3mm plywood with the exception of servo mounts in the body (the two top most parts) which should be cut from 5mm plywood to get the right depth for the servos. Material with different but similar thickness should also work just fine. Check that the (body) servos will poke through the two layers. Always measure the actual thickness as it often differs from the nominal value. Baltic birch has worked well for us. Poppler is a bit weak but may work now as some weak points in the model have been addressed.

For the head you do not need to change any settings except the burn value. It depends on the properties of the laser cutter and material you are using. It is possible to cut the parts stiff enough that most joints do not need to be glued together.

But then you may need a hammer, vice or press to get things together.

As mentioned at the beginning you can use almost any sheet material, you might need to adjust the design files (if the material comes in different thickness) but you can do Otto robots like our Otto builder [@pawan](#) did!:



If you use brittle material as acrylic this is not an option and you have to use a smaller burn value to get a more loose fit. For the legs you have a few settings to consider.

The anklebolt diameters are meant for a M3 screw that get threaded directly into the wood. If you are using a different screw size you need to adjust these two.

The default leg length is 37mm. But we found the robot to be a bit less prone to falling over with shorter legs. 34mm



your vector graphics / CAD program e.g. Inkscape.

Depending on your laser cutting software it may be necessary to manually select the order of the parts cut. For the head the rectangular holes in the hinges need to be cut first. Then all the other holes and the outer border of the parts last.

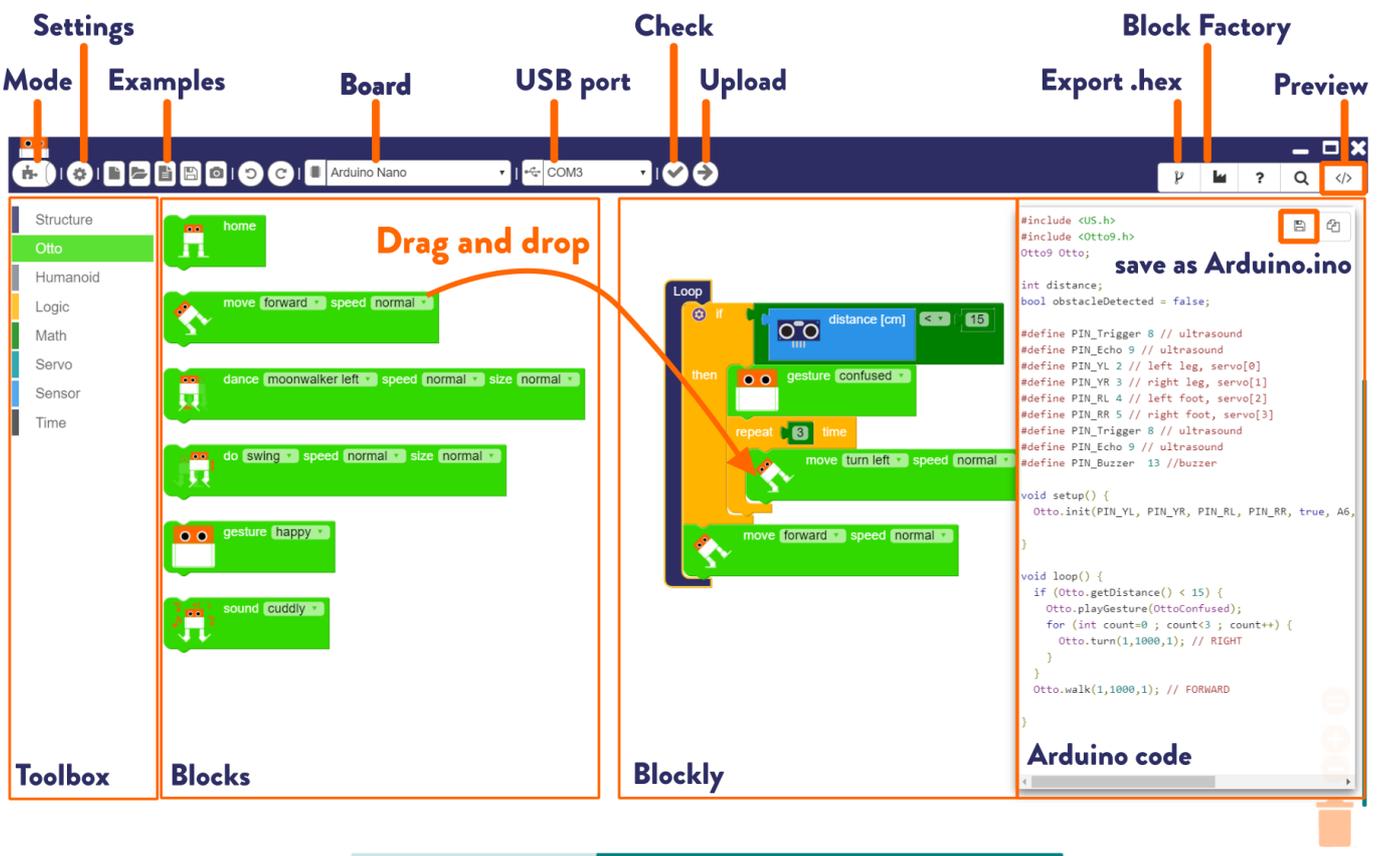
Generate the body <https://www.festi.info/boxes.py/OttoBody>

Generate the legs <https://www.festi.info/boxes.py/OttoLegs>

## Software

**For beginners it is recommended to start coding by using our new Blockly a simple visual programming software:**

Otto Blockly is completely autonomous (no need for Arduino IDE, or libraries setup and no Internet access is required).



1. Download from our github website here (<https://github.com/OttoDIY/blockly/>)
2. Unzip and install.
3. Open the example for Humanoid.
4. Connect your Otto robot.
5. Select Arduino nano Old Bootloader, **USB port where Otto is connected.**
6. Check the code.
7. Upload and yes is that easy!

Easy and simple visual coding for Arduino with Otto Bl...





If your computer did not recognize the USB device you should install the driver CH340 for your Operative System find it here: <https://sparks.gogo.co.nz/ch340.html>

Play with the examples and start mixing blocks in multiple ways to decide the behaviour of your robot and generate your own codes.

**OttoBlocklyguide.pdf** (latest) 

[+OttoDIY/otto-diy/Instruction manual/OttoBlocklyguide.pdf](#)



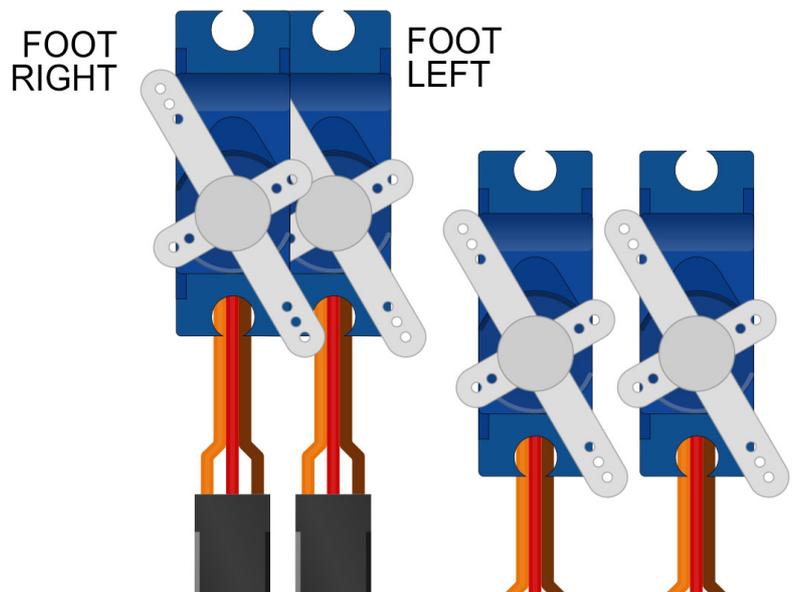
Learn more about [Otto Blockly in our video tutorials here](#)

### Testing the electronics

As a good practice you should check your electronics and software in your computer, before assembling all robot to avoid having to disassembled the whole robot to fix something.

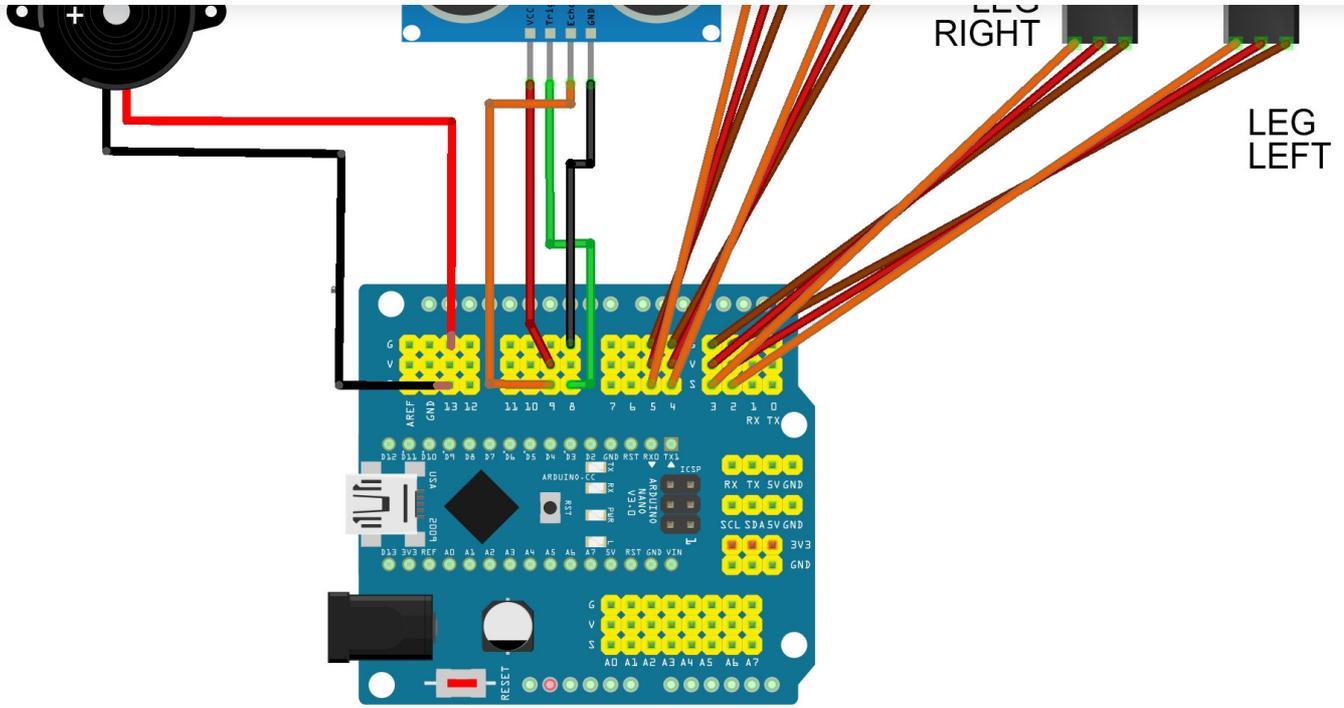
- 1 . Download & install the Otto Blockly <https://github.com/OttoDIY/blockly/>
- 2 . Connect your Arduino Nano Old Bootloader through USB (your computer should install the drivers), and you should find your Otto connected in the COM#)
- 3 . Connect by following the wiring electronic diagram
- 4 . Finally open & upload the any example sketch into your robot..

If all is good all moving you are ready to build your own Otto!





Search Wikifactory...



fritzing

### Otto DIY LC Manual (v10)

OttoDIYLC\_Manual\_V10.pdf (latest)

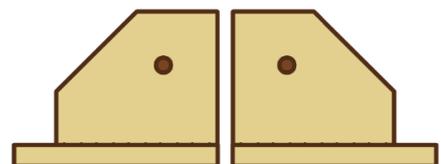
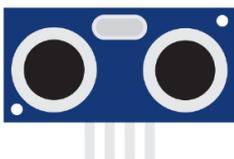
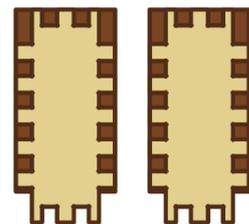
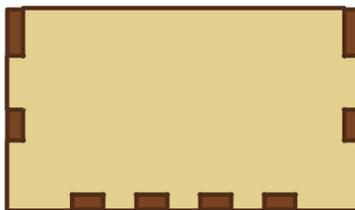
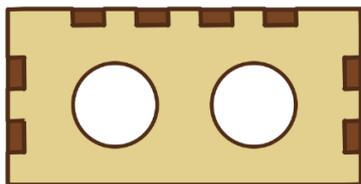
[+OttoDIY/otto-diy-laser-cut/Instruction Manual/OttoDIYLC\\_Manual\\_V10.pdf](#)

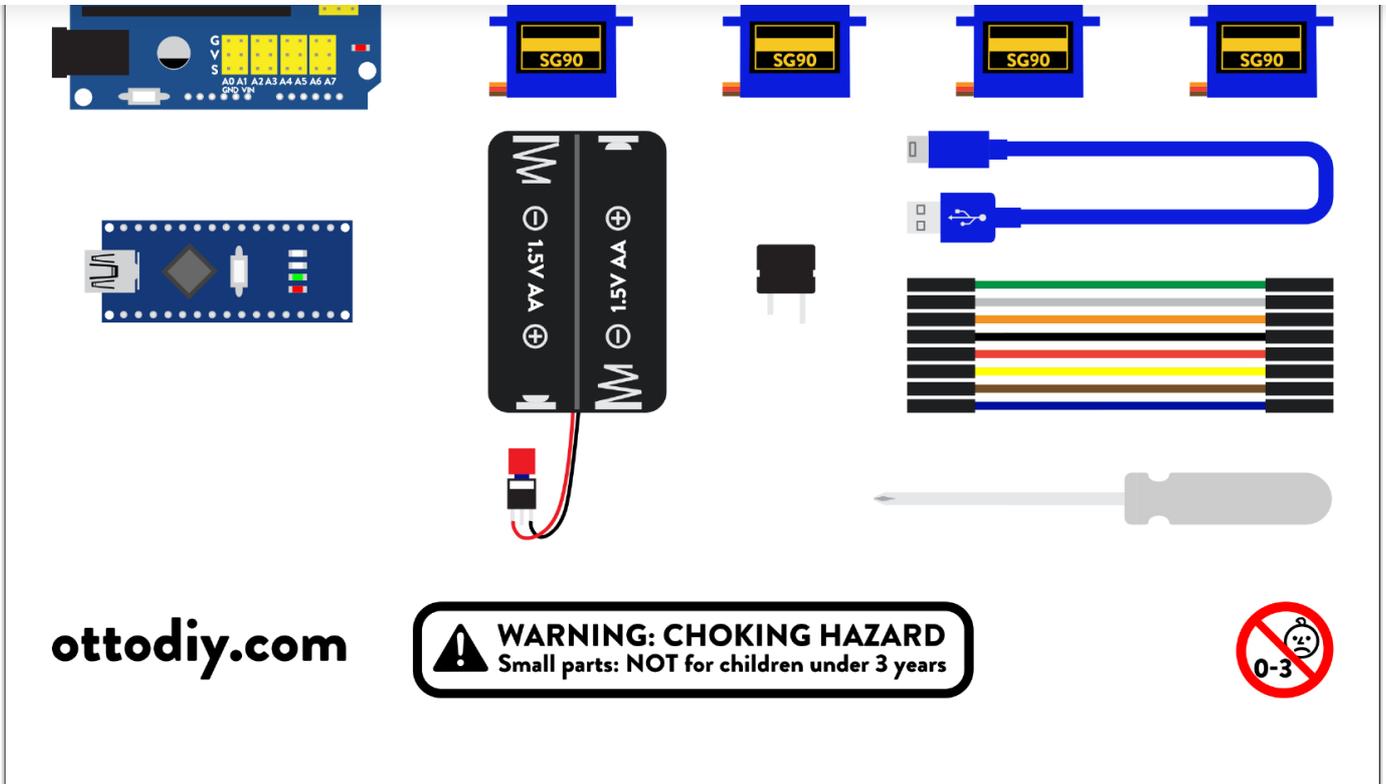


level



version 10





### Assembly instructions

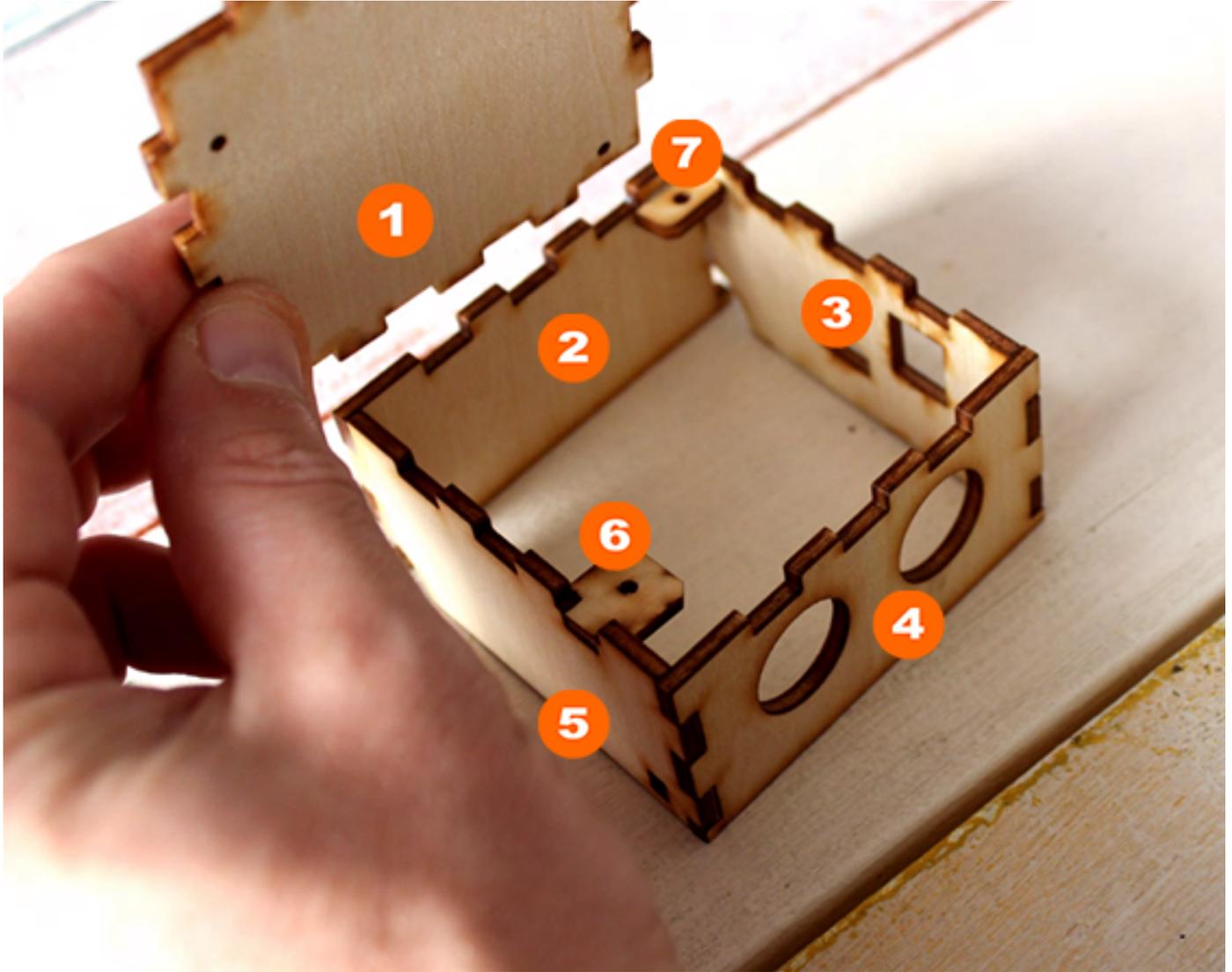
Find here all the available information for mounting your Otto DIY LC:

- Official Manual in previous section.
- [Here](#) you can find detailed instructions for Otto DIY LC version 9 [PDF 800 MB].
- For latest version of OTTO DIT LC, version 10, you can follow next video:





## HEAD



## BODY

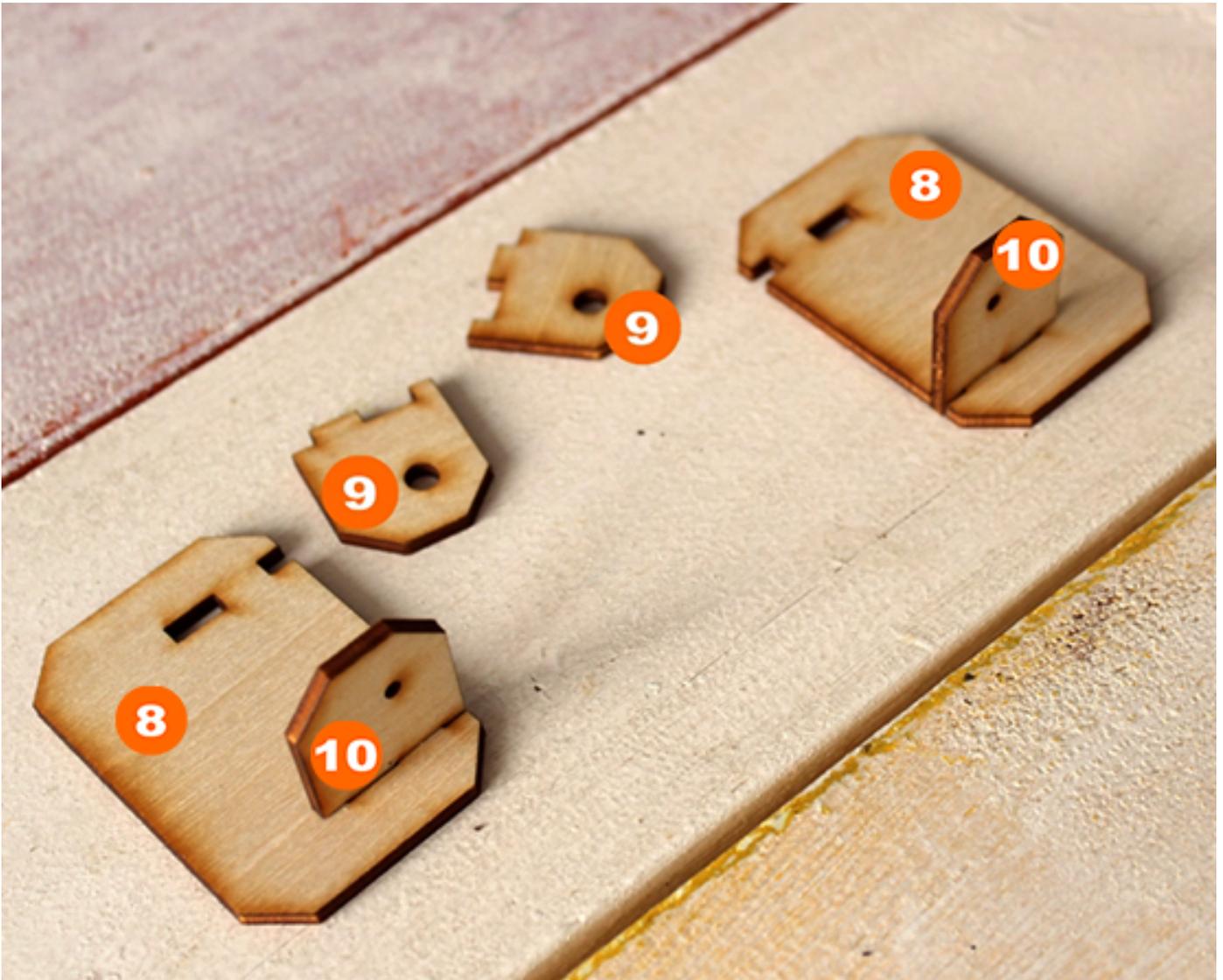
Note: Don't glue piece 13 yet





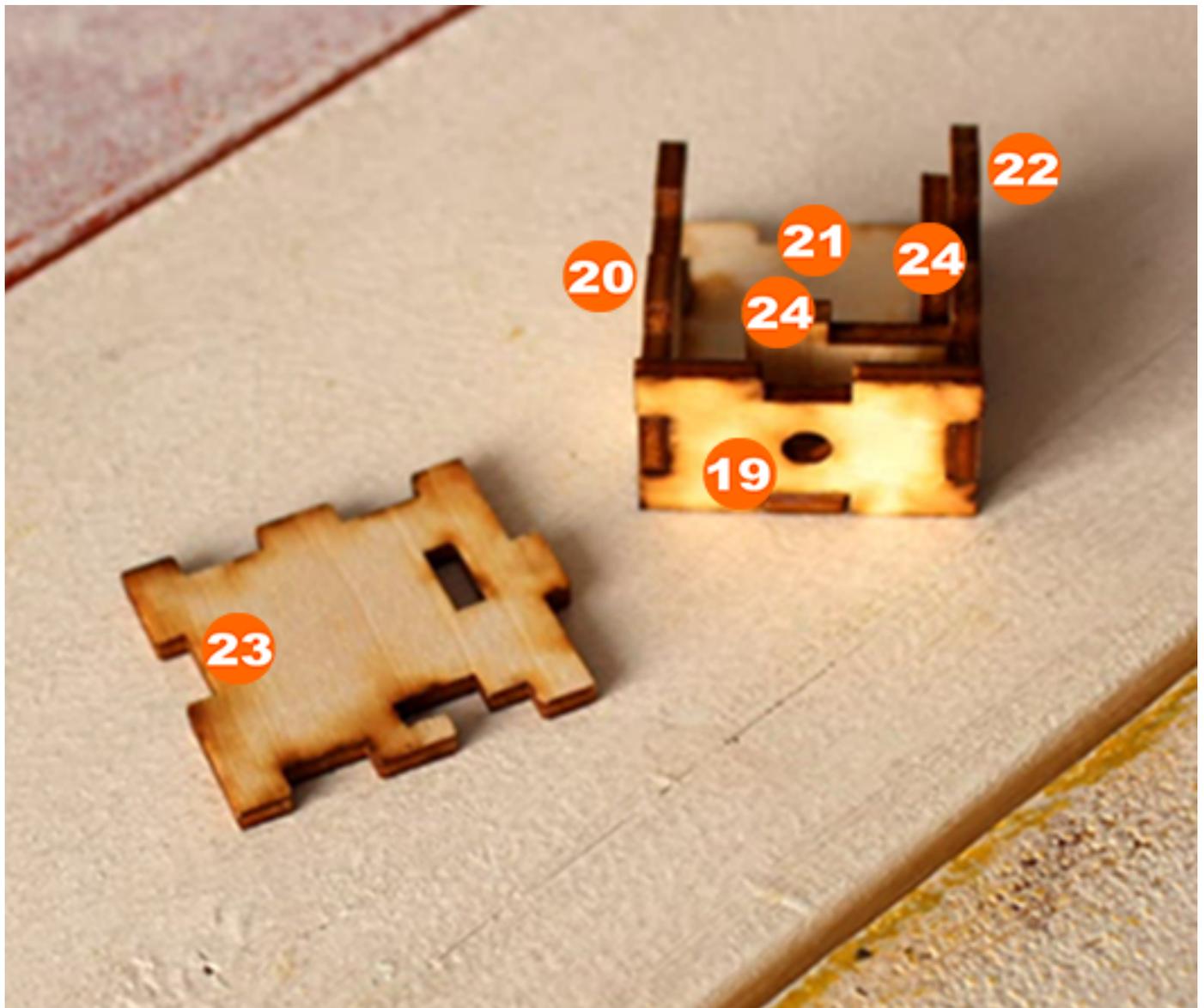
### FEET

Note: Don't glue pieces 9 yet



### LEGS





### ASSEMBLY BODY AND HEAD

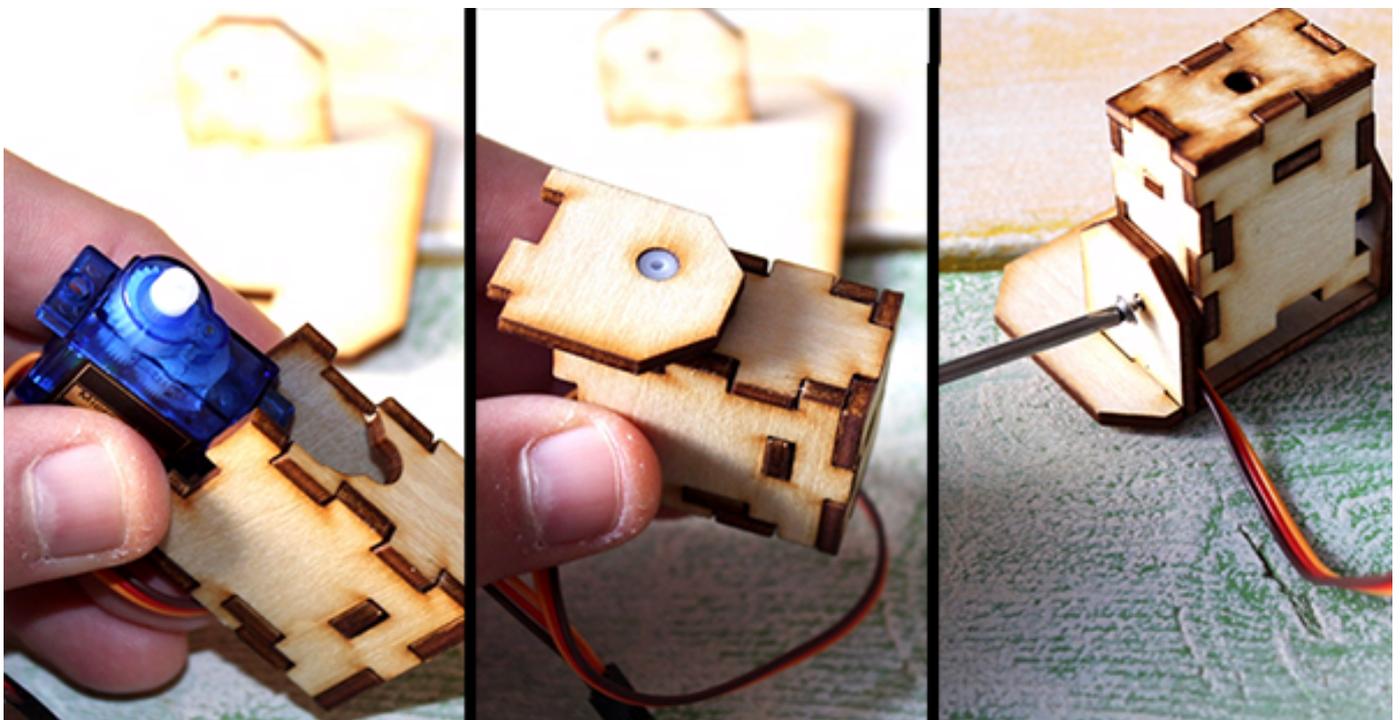
First place piece 18 in the body. Then glue head to this piece 18. Now glue piece 13 to the body. Place last piece 18 and finally glue it to the head.

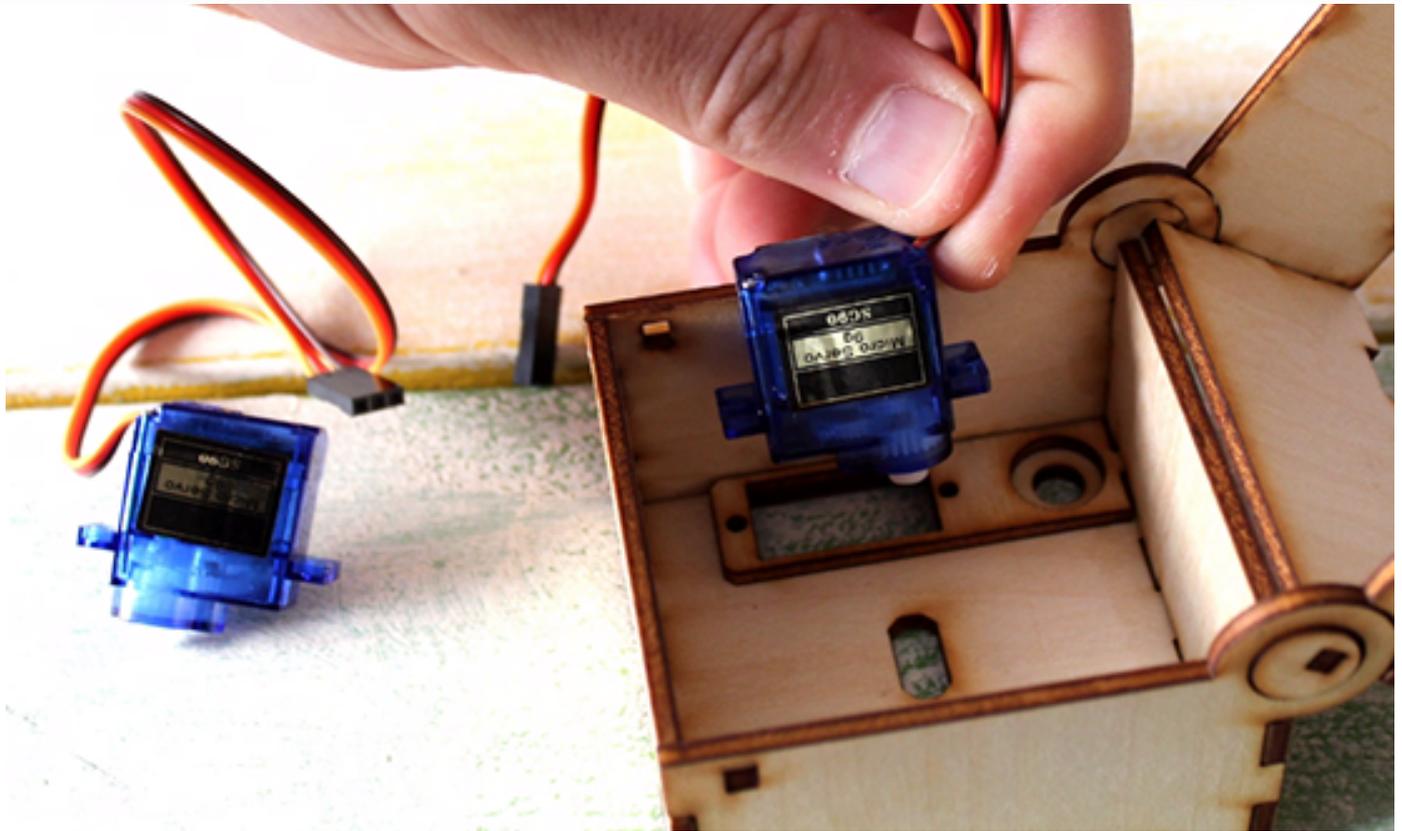


### Install the electronics

For putting electronics parts, motors and so on just follow how [other Otto robots](#) are assembled. It is the same principle.

### SERVOS





## BODY COMPONENTS

- Add the buzzer inside the body
- Add the battery holder inside the body
- Add the ultrasonic sensor in the head
- Mount the Arduino nano board in the I/O shield
- Follow schematics described in previous section to connect all the components

## ARDUINO

- Place the arduino board inside the head

## Legs and Feet: Calibration

When turning the robot on again it should stand up pretty much straight. Small misalignments can typically be adjust in software (depending of the firmware you are using). For larger errors you should disassemble the part and put it back together.

If you see some missalignment in the movements check that you centered your servos before assembly but if you want more precise walk and movements then you can do some electronic callibration as we explain in this blog post article: <https://www.ottodiy.com/blog/calibration>

If you care confident that everything is OK you can also glue the legs on.

Your Otto LC is complete now. You may want to replace the program with something more fancy or even create your own moves.

Once the head is snapped in, prepare to upload other codes in the same way we tested the electronics. Finally open & upload any of the [Otto Blockly examples](#) available under the examples button.



Follow us, subscribe, give us a like and share your creativity. Be a part of this friendly community of robot builders, teachers and makers!

1. [Join the Otto Builder community here](#)
2. [Group in Facebook](#) to share and ask for help in the community and like our [Facebook page](#)
3. [YouTube channel](#) for more how to videos and tutorials.
4. [Instagram](#) follow us and share #ottodiy
5. [Twitter](#) follow us and share #ottodiy

Welcome to our Otto Builder community!

## How to contribute?

1. [Accept the invitation to join this project, click here](#) you will need to sign in/up
2. Now you are able to [upload new files or edit current ones](#)
3. Click on the contribute button and describe your changes.

That simple! happy to have you as a part of the Otto Community :) and thanks!

## Next Steps

Congratulations you have made probably your very first robot! or at least your first Otto :D

Learn more about coding, electronics, design, 3D printing, Artificial Intelligenc, robotics [and more in our Otto Academy](#)

After that is time to [add a Bluetooth module](#) to play and [learn coding with the mobile APP](#), alternately you can upgrade your Otto [with more sensors](#).

[Follow the instructions here for Otto DIY+ in the Bluetooth section.](#)

See you there!

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