Lola-OP^{TM}
Modular Snake Robot

ASSEMBLY MANUAL

-RoBoTa s.a.s

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Credits

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ASSEMBLY MANUAL

Preface

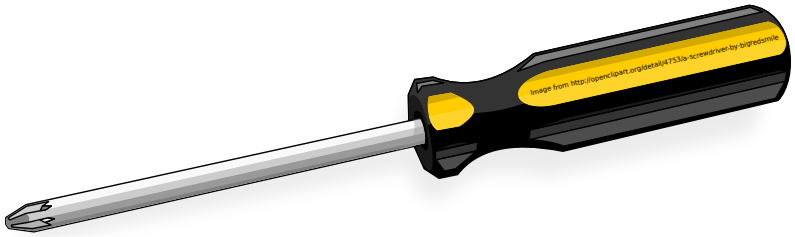
In this manual, you will find instructions to assemble a Lola-OP^{TM} Modular Snake Robot, developed by KM-RoBoTa s.a.s., and wire it. Through this guide, the reader will be capable to identify the parts and understand by diagrams the assembly procedure. This manual is divided in three parts, namely the tools and parts description, the assembly and the wiring procedure. Your feedback will be very appreciated.

Please enjoy the time you will spend building up this amazing robot !!!

1 Tools and Parts Description

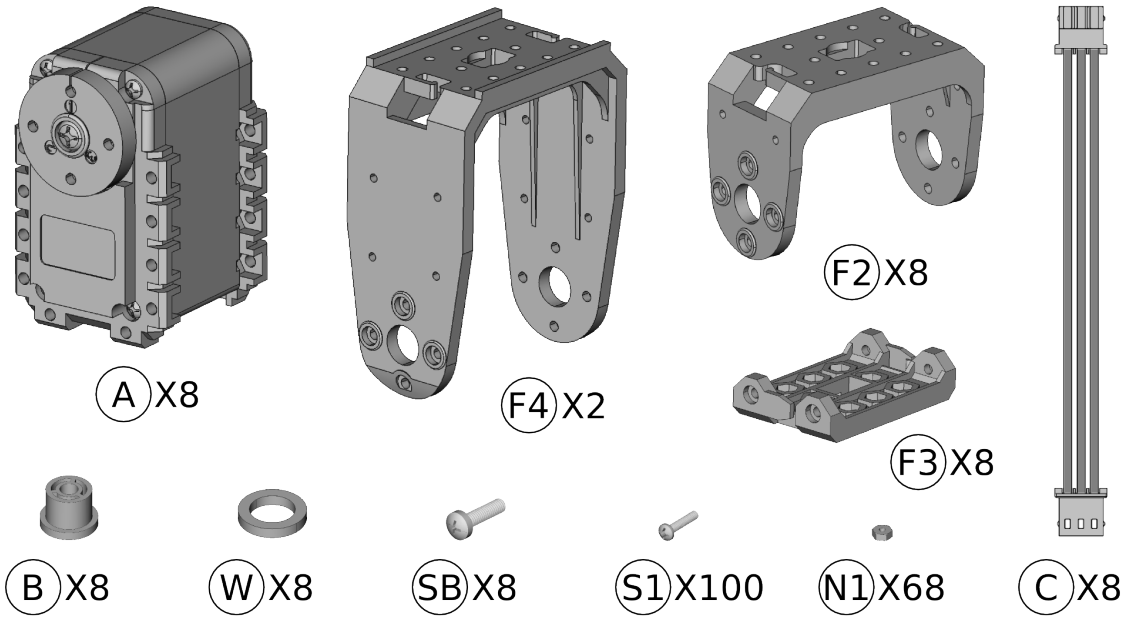
1.1 Tools

Prior to the assembly procedure, ALL YOU NEED is to find a simple Phillips (PH) screwdriver (choose an adequate size for ISO metric PHS M2X6 screws, diameter: 2-3 mm).



1.2 Parts Description

Lola-OP^{TM} Modular Snake Robot is composed by simple pieces.



There is 1 type of actuator (A), 3 types of plastic frames (F2, F3, and F4), 2 types of screws (SB, S1), 1 type of nut (N1), plastic washers (W), bushings (B) and connecting cables (C). The quantity of pieces that should be employed, depends of how many modules do you want in the robot. Yeah!, this is one of the nice things to work in MODULAR snake robots. For the sake of this manual, we are going to use a 8-degrees-of-freedom (8-DoF) Robot.

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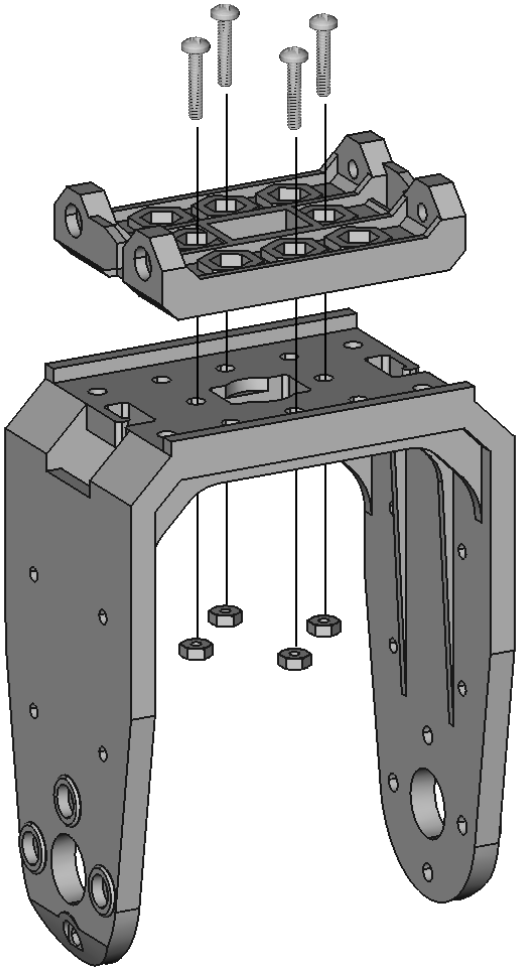
2 Assembly

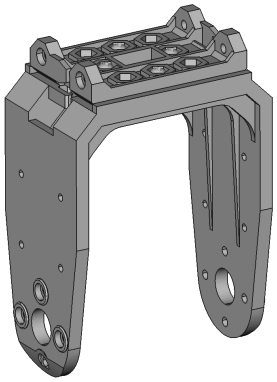
In series of images, we are going to show you the procedure to assemble the robot. There are many ways to assemble the robot. However, we recommend to follow our instructions (based on our wide experience with this robots).

2.1 Tail Assembly

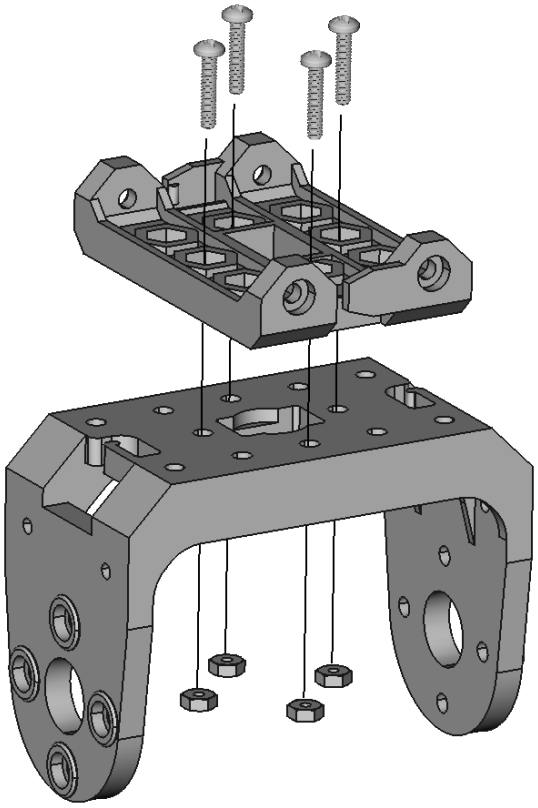


Part	Description	Qty.
F3	Plastic Frame F3	1
F4	Plastic Frame F4	1
S1	Screw M2X6	4
N1	Nut M2	4

The resulting piece will be called henceforth *Tail*, designated as (T).

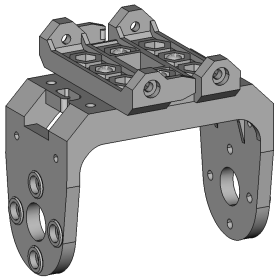


2.2 Joint Assembly

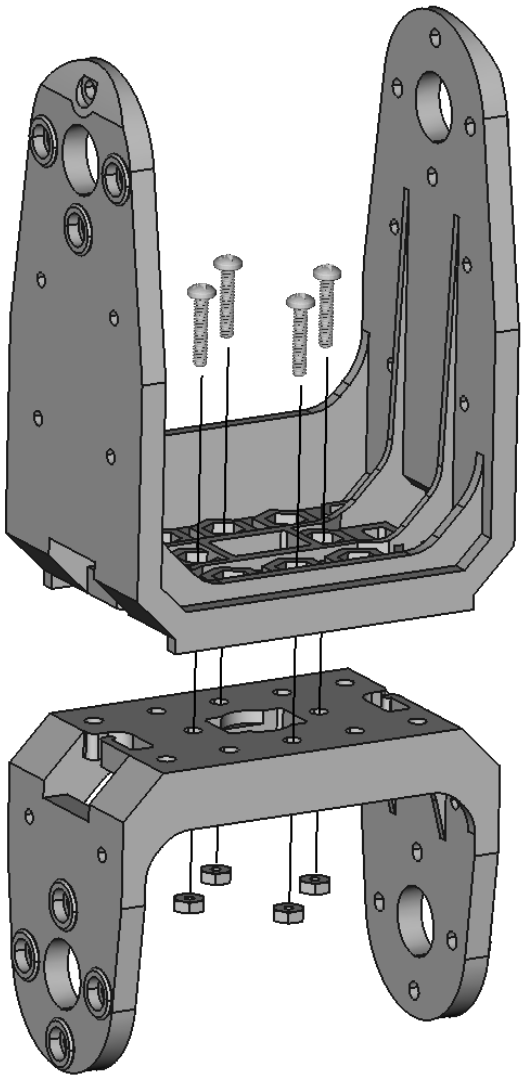


Part	Description	Qty.
F2	Plastic Frame F2	1
F3	Plastic Frame F3	1
S1	Screw M2X6	4
N1	Nut M2	4

The resulting piece will be called henceforth *Joint*, designated as (J).

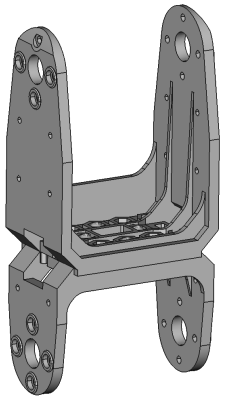


2.3 Head Assembly

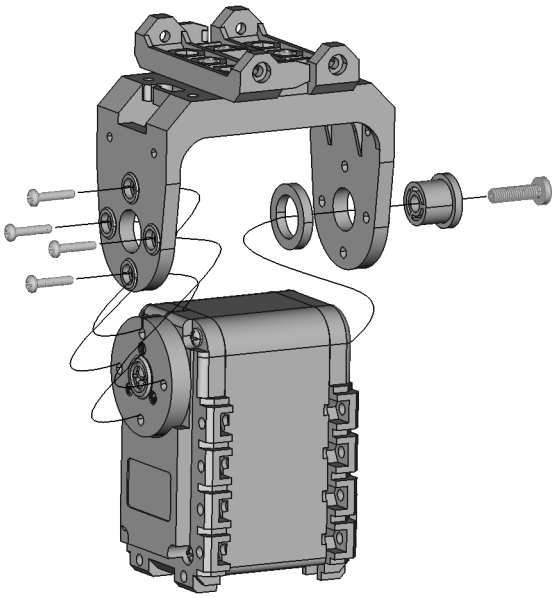


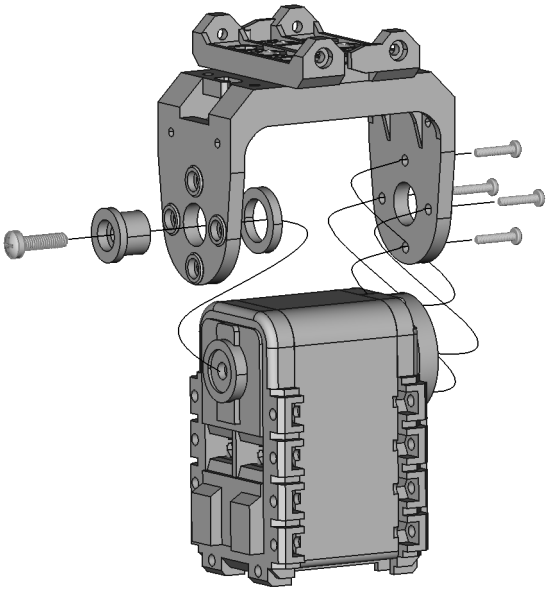
Part	Description	Qty.
F2	Plastic Frame F2	1
F4	Plastic Frame F4	1
S1	Screw M2X6	4
N1	Nut M2	4

The resulting piece will be called henceforth *Head*, designated as (H).



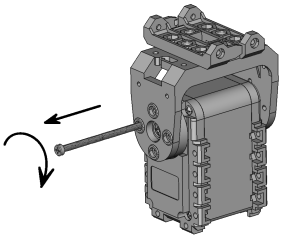
2.4 Module Assembly



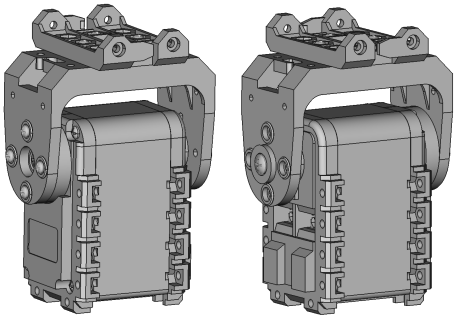


Part	Description	Qty.
A	Actuator	1
J	Joint Assembly	1
S1	Screw M2X6	4
SB	Screw M3X10	1
B	Bushing	1
W	Washer	1

NOTE: In the case that one of the (S1) screws do not fasten properly, try to re-locate the nut inside the actuator's rotor shaft, by inserting a large screw and pull it out, to secure the nut on its place.



The resulting piece will be called henceforth *Module*, designated as (M).
Front and Rear views of the assembly are provided.



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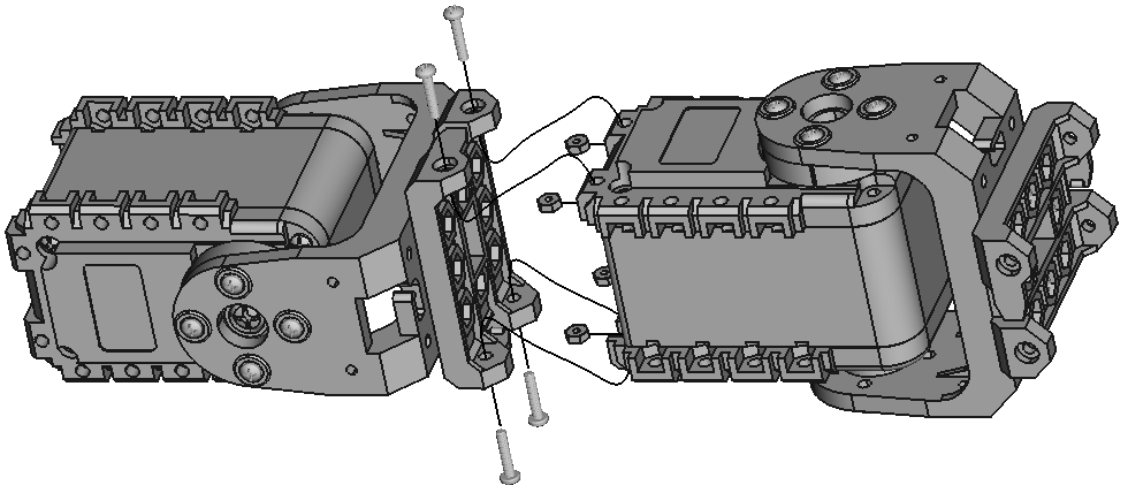
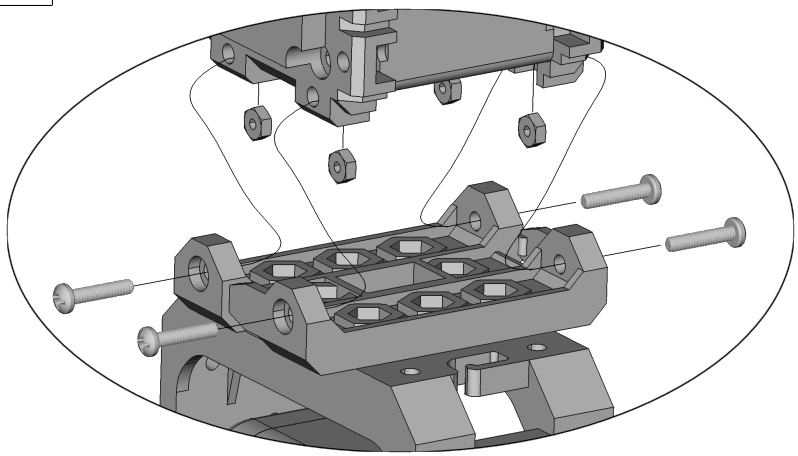
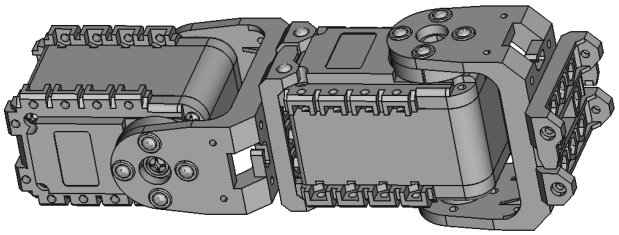
2.5 Body Assembly



Part	Description	Qty.
M	Module	2
S1	Screw M2X6	4
N1	Nut M2	4

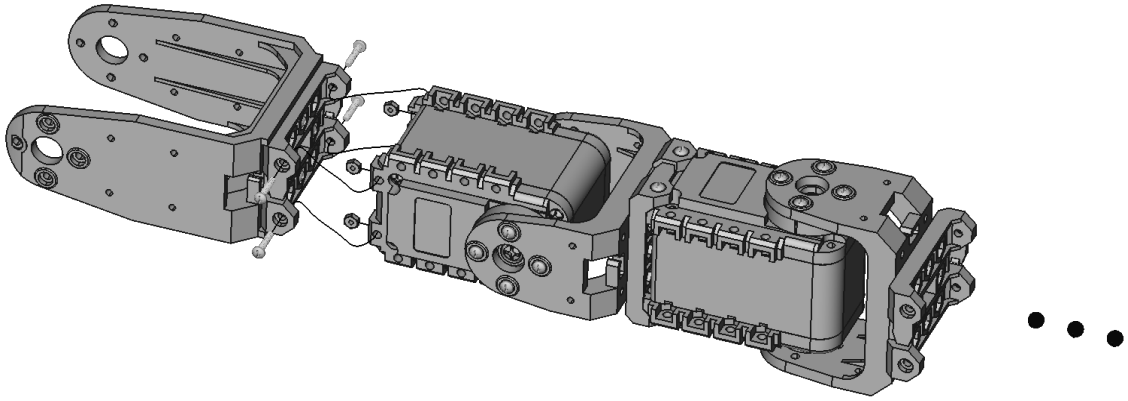


Body assembly, designated as (B) and its respective detail. The resulting piece, will conform the body of the Modular Snake Robot. You can add as many modules as you wish, however, the order matters and consecutive module numbers should be respected, starting from Module 1. Additionally, please ensure an even number of modules, to be consistent with the robot controllers already developed.



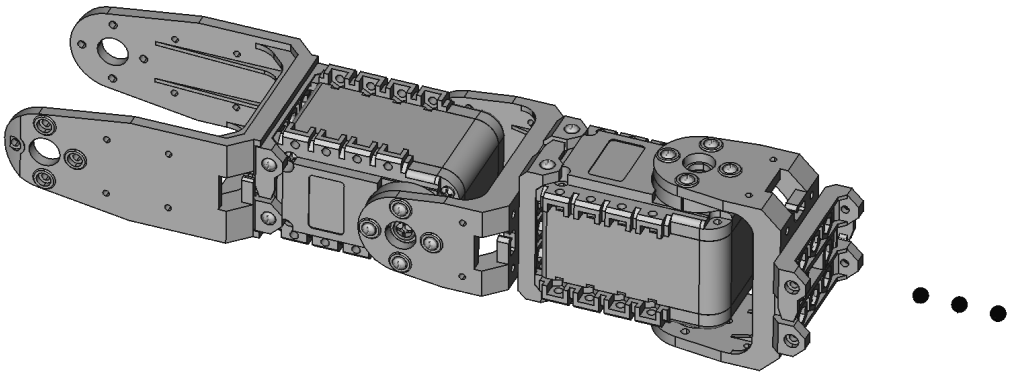
2.6 Head and Tail Addition

To finish the mechanical assembly of Lola-OP^{TM} Modular Snake Robot, only two simple extra procedures left. The addition of the Tail (T), to the first module (M) that conforms the body (B):

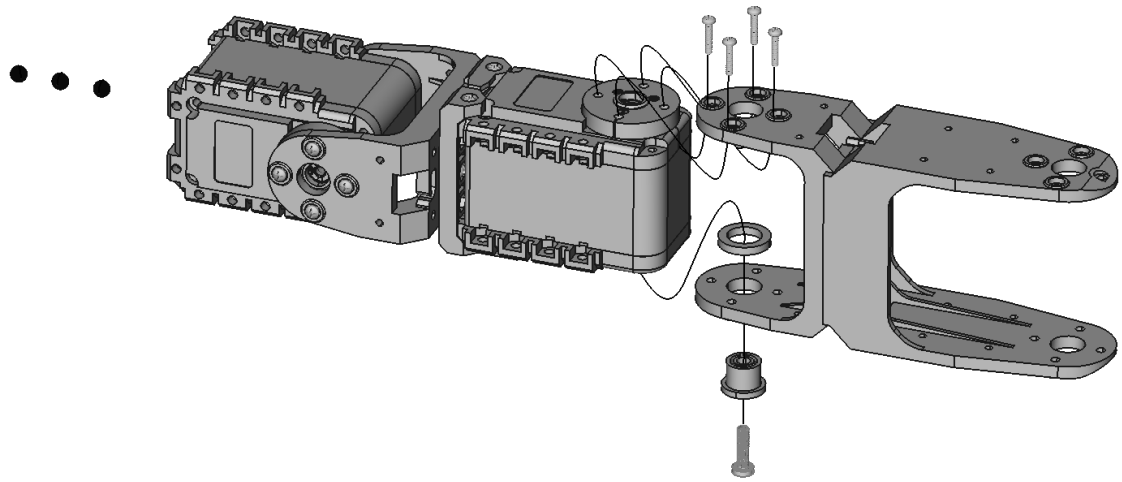


Part	Description	Qty.
T	Tail	1
B	Body (first module)	1
S1	Screw M2X6	4
N1	Nut M2	4

which results in:

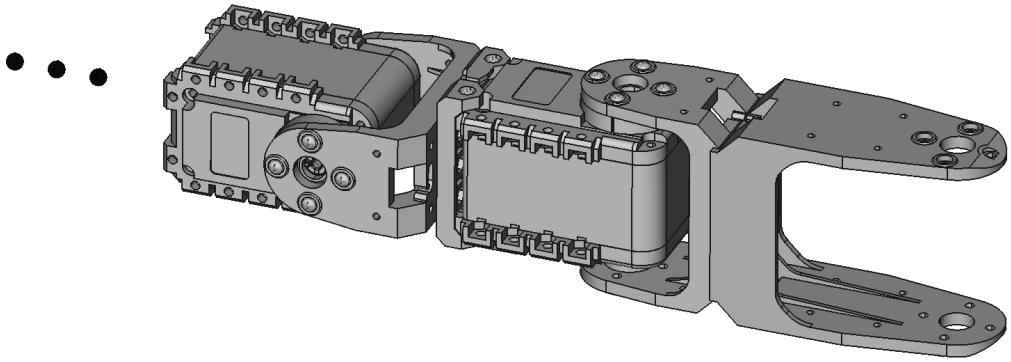


And finally, the addition of the Head (H) to the last module (M) of the body (B).



Part	Description	Qty.
B	Body (last module)	1
H	Head	1
S1	Screw M2X6	4
SB	Screw M3X10	1
B	Bushing	1
W	Washer	1

which results in:

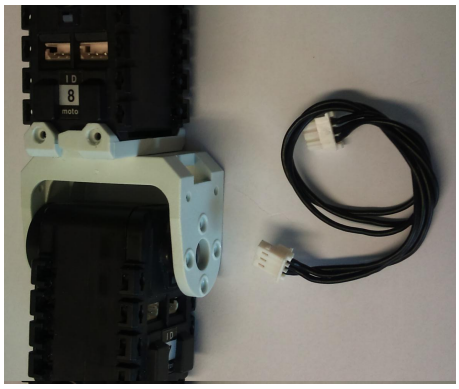


Congratulations, you have completed the mechanical assembly of Lola-OP^{TM} Modular Snake Robot.

3 Wiring Procedure

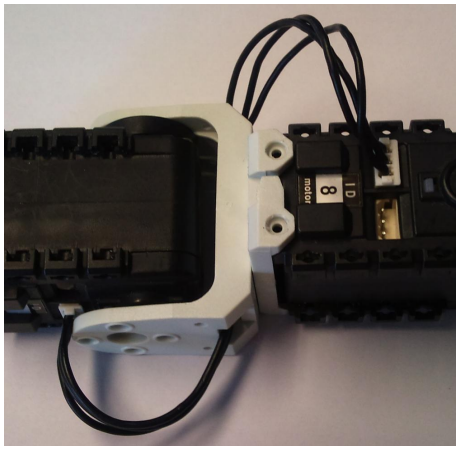
Once your Lola-OP^{TM} Modular Snake Robot, is mechanically assembled, it is time to wire its modules and to place and wire the LiPo 3S 1300mAh battery.

3.1 Inter-Module Wiring



A set 18mm double ended Molex connector cable is provided.

This cable, should be inserted and passed through the specially designed holes of the plastic frame (F2).



Finally, the cable must go from the second socket of previous module to the first socket of next module. Please follow the sequence all along the robot's body.

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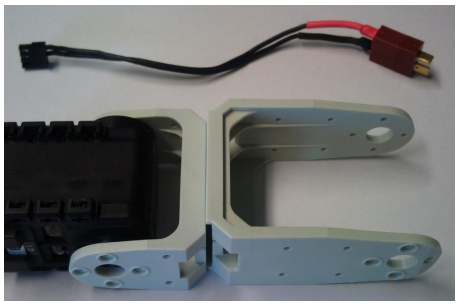
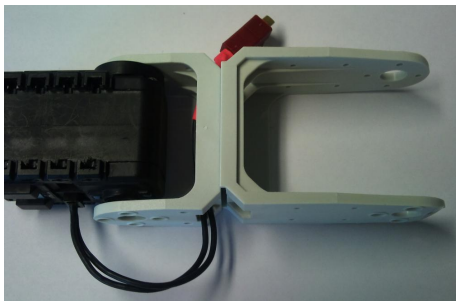
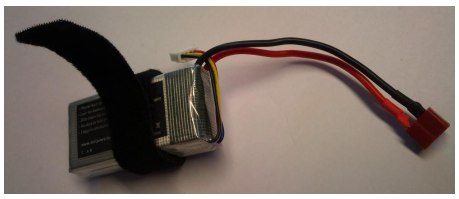
3.2 LiPo Battery Placement and Wiring

LiPo battery should be placed in either head (H) or tail (T) end modules. For convenience, we will place it in the head (H) module[1]. All you need is to place the provided cable, passing it through the (F4) frame of the head module (H).



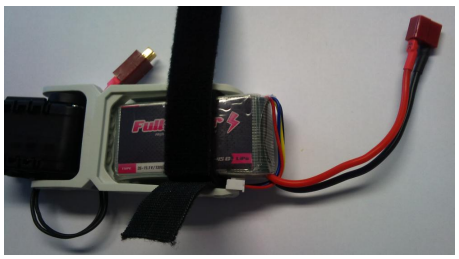


To attach the LiPo battery to the Head (H) module, we recommend the use of 30cm double sided velcro straps. First, wrap the LiPo battery with one velcro strap.



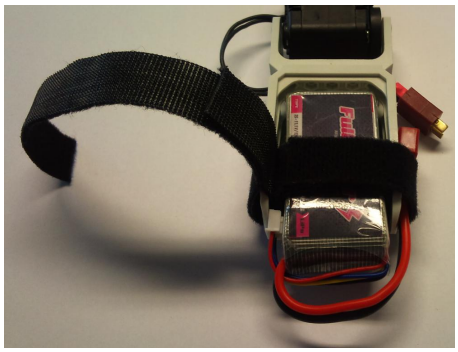
The LiPo battery will be thick enough to perfectly fit in the plastic frame (F4).

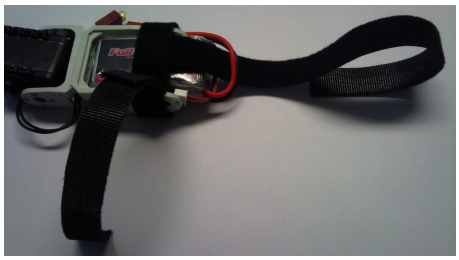
Add a second velcro strap to attach the LiPo battery to the Head (H) module. Be aware, that the LiPo battery balancing charge connector is secured inside the plastic frame while the power leads remain free.



[1] It is really convenient, as in the current version, data cable is "naturally" attached to the tail (T) module.

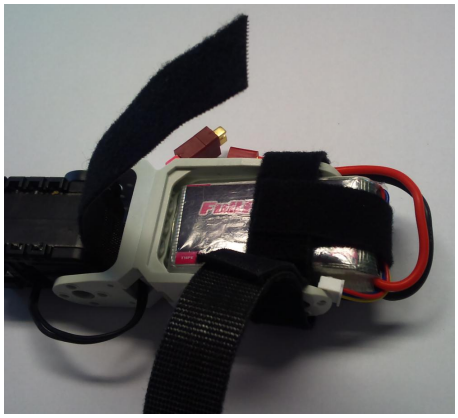
Secure the power leads by wrapping them with the second velcro strap.

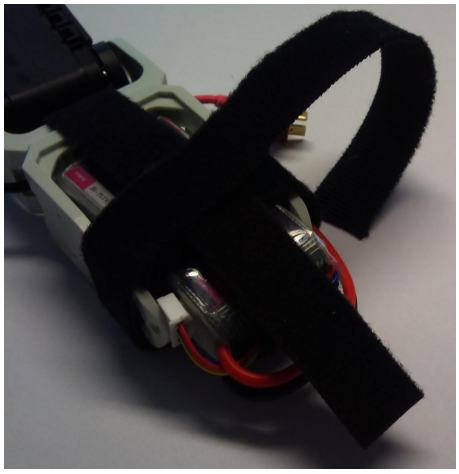




Add a third velcro strap. It will be placed perpendicular to the others, securing the LiPo battery to the head module (H) plastic frame.

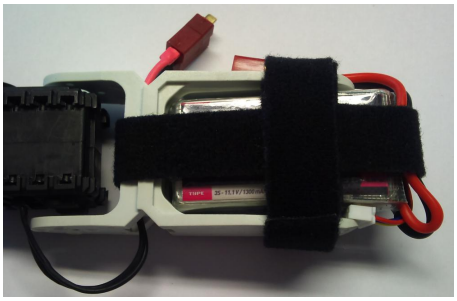
First, secure the balancing charge leads, then pass it behind the head module plastic frame.





Close the wrapping by crossing the velcro straps. Be sure that the power leads are secured.

Now, your Lola-OP^{TM} Modular Snake Robot is ready to be controlled.



Just turn it ON... like this.