



Assembly instructions and documentation for
Uppo Maker v3

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Introduction:

This guide is to be used for mounting and installing the UBBO Maker v3 robot kit. It also provides an explanation of how it works. The CD supplied with the robot contains the source code as well as explanations regarding the software operation.

We advise “novice” makers to read the guide completely before assembling the robot, and to fully understand its operation. As such, OpenClassroom (<https://openclassrooms.com>) can be a particularly useful site.

Critical elements, in particular related to the various connections, are repeated several times in order to avoid any connection error.

In case of doubt, whether on the assembly of the robot or on the supplied parts, you can contact AXYN Robotique in the following ways:

- By mail :

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- By Phone:

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- By postal mail :

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Nomenclature

Parts	Qty	Picture
Screws and Fasteners		
Bhc m3*12 screw	4	
4-40 screw (US)	2	
Rubber washer M3	1	
Bhc m4*6 screw	2	
Self tapping screw	1	
CHC 6 M3*30 Allen screw	2	
M4*30 Convex head screw	10	
M6 Hexagonal screw	4	
M6 Nut	4	

10mm nylon spacers + screw + nuts	36			
8mm nylon spacer + nut	4			
Rubber grommet	4			
Rubber washer	12			
Metal washer	4			
M4 Rubber insert	10			
M3 Rubber insert	2			
led clip	1			

Wiring	Qty	Picture
3-wire electrical cable (red, black, white)	4	

Electric wire	10 Male/Male	
Electric wire	1 set of 10 male / female	
Electric wire 1,5mm ²	3m (red + black)	
Scratch	20 cm	
USB A / Micro USB Cable	1	
USB A / Mini USB Cable	1	
USB A / USB B Cable	1	

Battery cables (1 power management board cable and 1 charging connector cable)	2		
Power supply	1		
Male connector	1		
on/off switch	1		

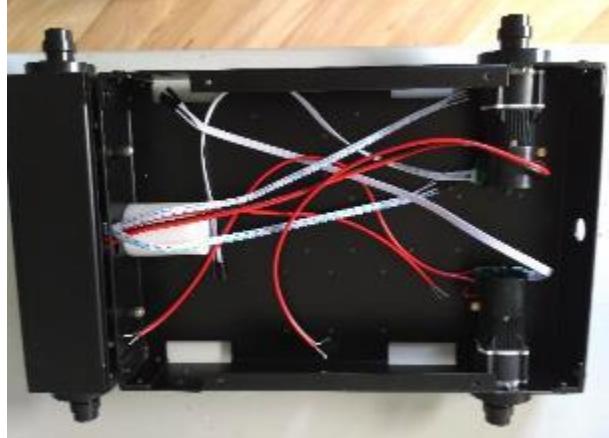
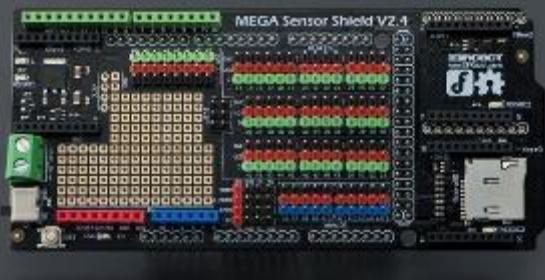
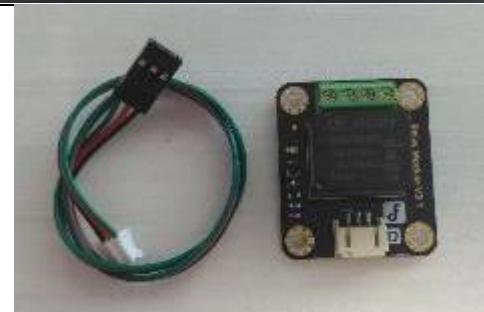
Item	Qty	Picture
Tilt		

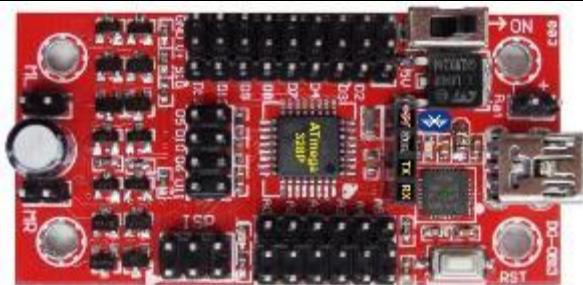
Electrical terminal	4*5 4*3 5*2	
Clamping collar	10	
Servo-motor	1	
Tablet mounting bracket (with U-shaped part and shaft connection)	1	

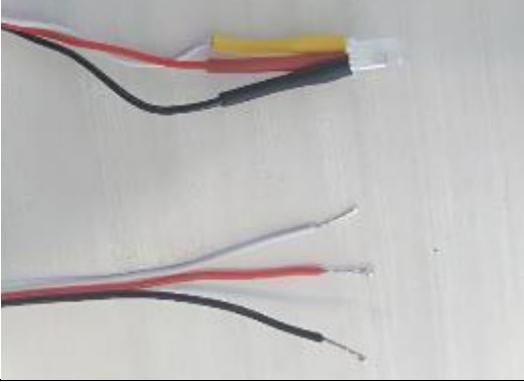
Padlock + key	1	
bearings	1	
Servomotor rudder	1	
shaft rudder	1	
Rotation shaft	1	

Item	Qty	Picture
Mast		
Metal rod	2	
Rubber sheath	2	
Lead wires (for 5V)	1,5m	
Data wires	1,5m	

Item	Qty	Picture	
Body			
Pre-drilled chassis body	1		
Central body (2 parts)	1		
Upper body (2 parts)	1		
Lower body cover	1		
Infrared obstacle sensor + fasteners	4		
Sensor Plastic cover	3		
Dockstation pad	2		

Item	Qty	Picture
Mobile base		
Chassis with its 4 motors	1	
Mecanum Wheels (Warning: 2 left and 2 right, positioning is detailed in the assembly instructions) + 4 sets of screws, nuts and black washer.	4	
Arduino Mega [MAD]	1	
Shield Mega Sensor V2.4 [MS]	1	
Relay (RL)		

Item	Qty	Picture
DF-Bluetooth v3 [BT] Module	1	
Motor power board [MP]	2	
Voltage Converter Module [VC]	2	
Servo Control Board [CS]	1	

12V 10000mah battery with BMS	1	
Power management board (CDC)	1	
RGB Led	1	

Item	Qty	Picture
Accessories		
CD with : Arduino source code Libraries apk	1	

Tools

Item	Qty	Picture
Supplied tools		
Allen keys: US standards: 7/64 3/32 EUR standards : Complete set	1	
Additional tools required Not supplied		
Precision Screwdriver Set	1	
Mini-pliers set	1	
10mm Flat wrench	1	

Neoprene	1	
Cutter	1	
Protective gloves	1 paire	
Protective glasses	1 paire	
OPTIONNAL – Thread lock	1	

OPTIONNAL – Glue gun +
Glue

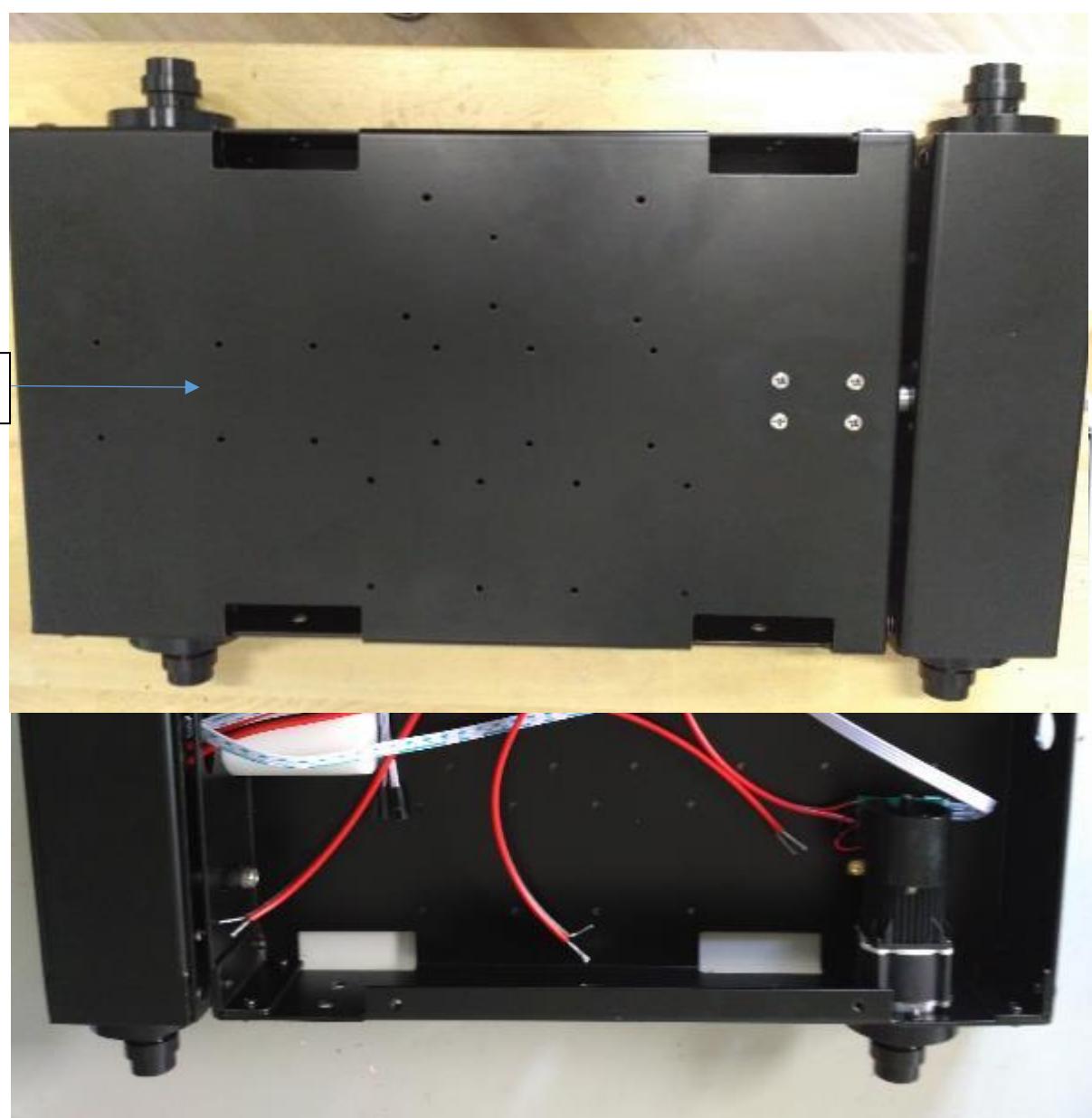
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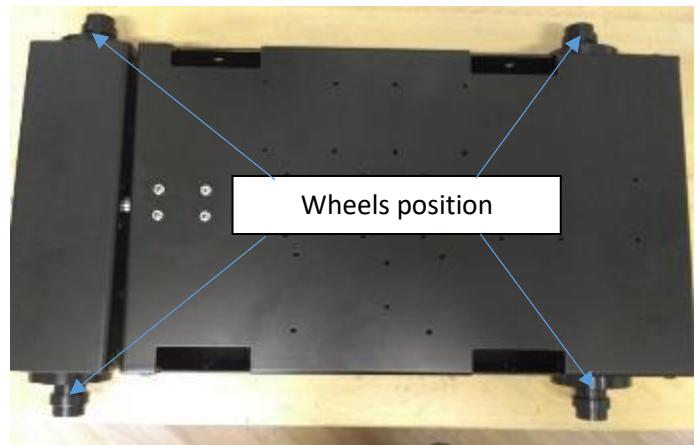


Chassis assembly

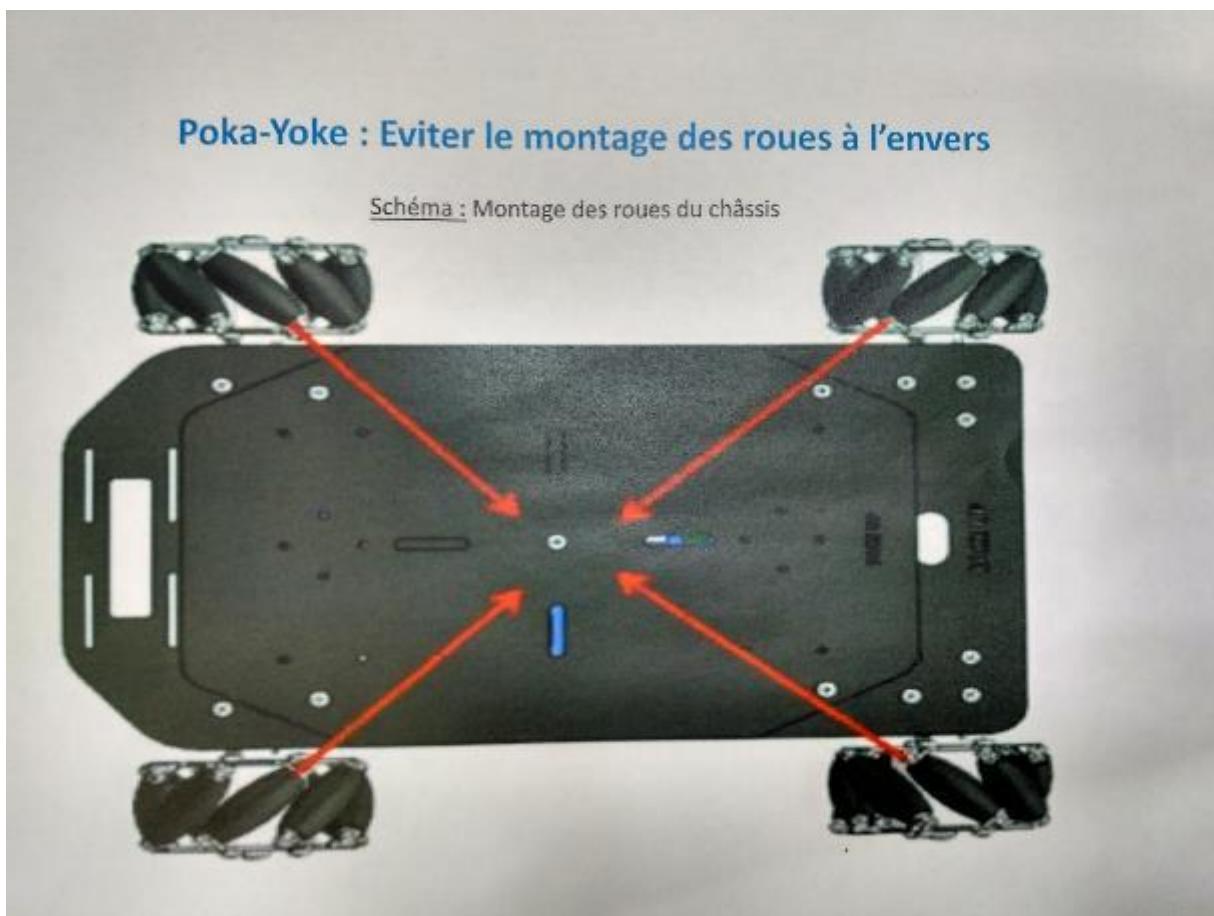
Mounting the wheels

Unpack the chassis





To install the wheels, insert them in their respective positions (the deepest side of the wheel towards the outside), paying attention to the direction of mounting the wheels (picture below - seen from above). Then put the black washers in each hole and then screw the screws with the small metal washer in.

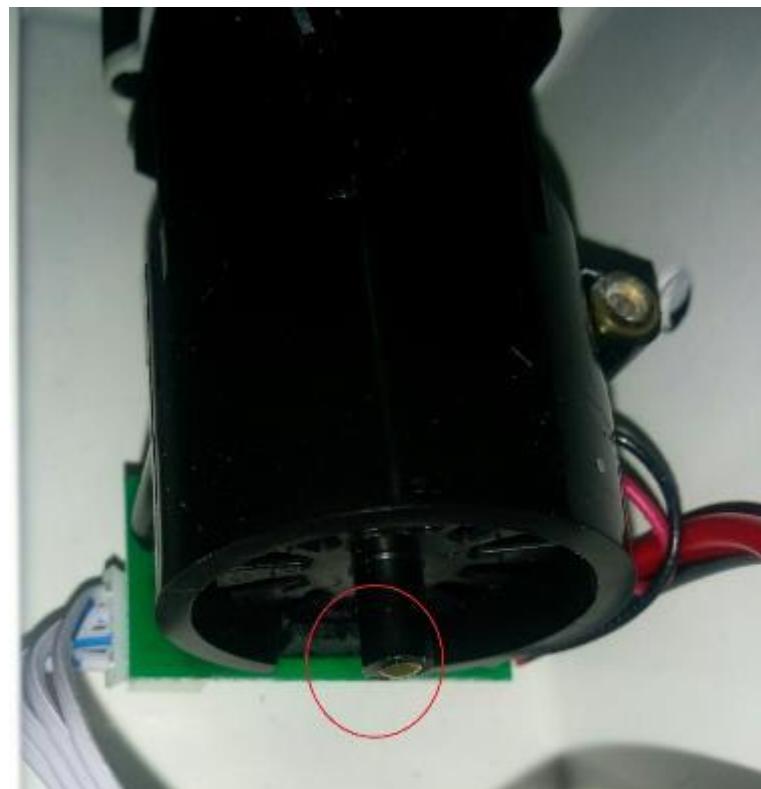


Testing the wheels

Turn the wheels by hand, making sure that the red and black electric cables of the engine are not in contact.

Two problems may arise:

- 1- A "clicking": the rods at the rear of the motor come to rub against the sensors. You have to identify the ones that rub and put them back straight.

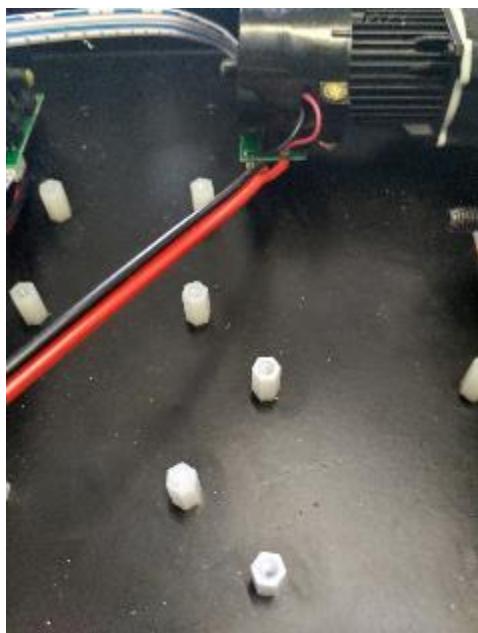


- 2- If the motor does not run smoothly, i.e. in some positions it is necessary to force to run the motor, this is due to an axial problem of the wheel. The part holding the bearing must be loosened slightly.



Adding spacers to the chassis

To attach the electronic boards to the chassis, screw a spacer into each hole in the chassis.



Entretoises avec vis et écrous.

Installing the electronic boards

Programming the board

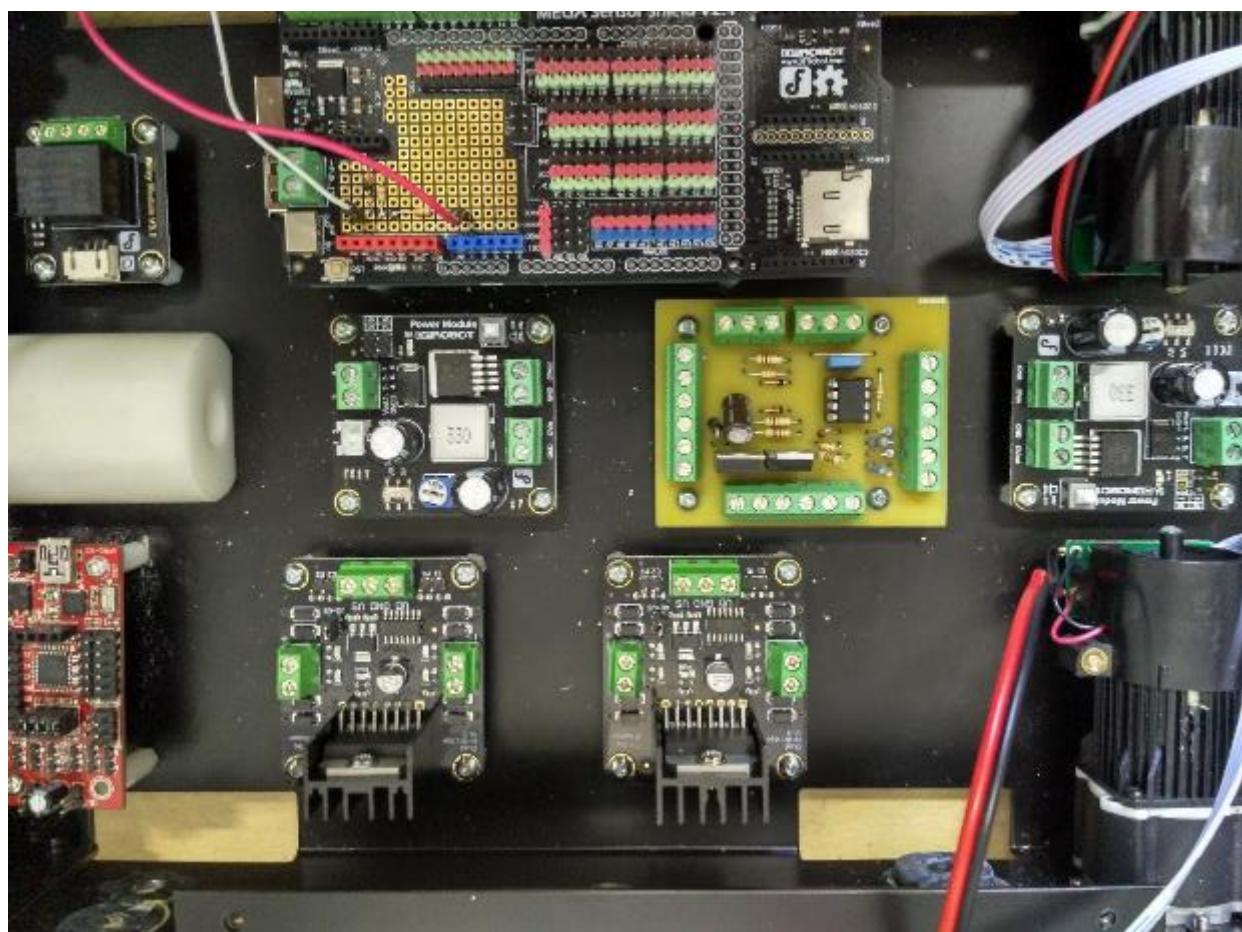
Before installing the cards in the chassis, it is necessary to program them. 2 boards are to be programmed, the arduino Mega and the small red arduino board.

The supplied Arduino sources are in the form of 2 directories: UBBO_Controller_vxx.xx for the Arduino Mega and UBBO_TabletServo_vxx.xx for the small Arduino red board. Files of the same name with the *.ino extension are the main files that must be launched with the Arduino environment.

For the installation of the Arduino environment and the programs on the boards, please refer to the official Arduino documentation: <https://www.arduino.cc/en/Guide/HomePage>.

Positioning the boards

Position and screw all cards to their locations as shown below.



Wiring :

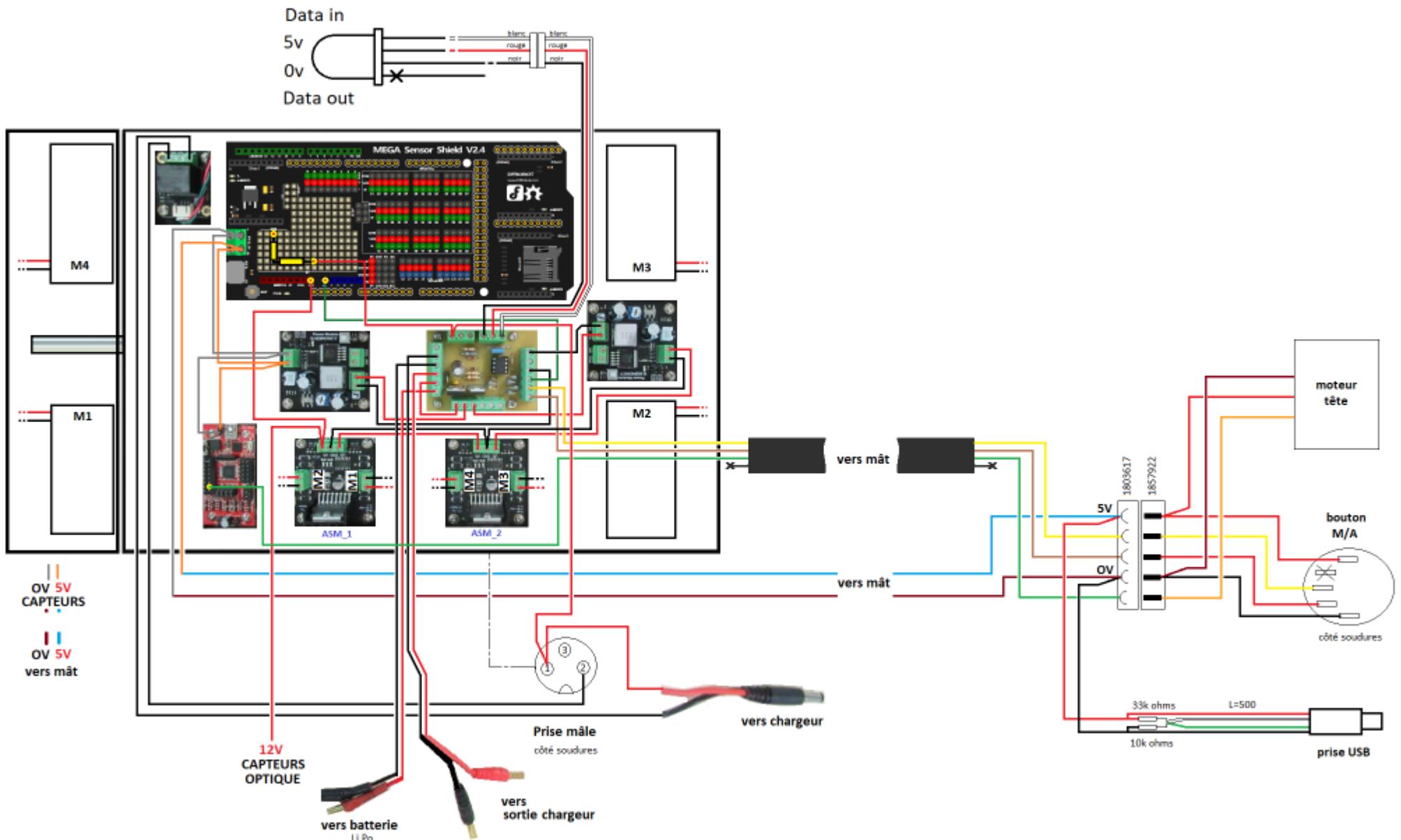
The electrical wiring of the robot is designed in such a way that:

- the robot can operate continuously when the charger is plugged / unplugged
- the whole robot is powered by the batteries or by the charger automatically
- the main power button controls the power supply of the electronic boards and accessories independently of the battery charging.

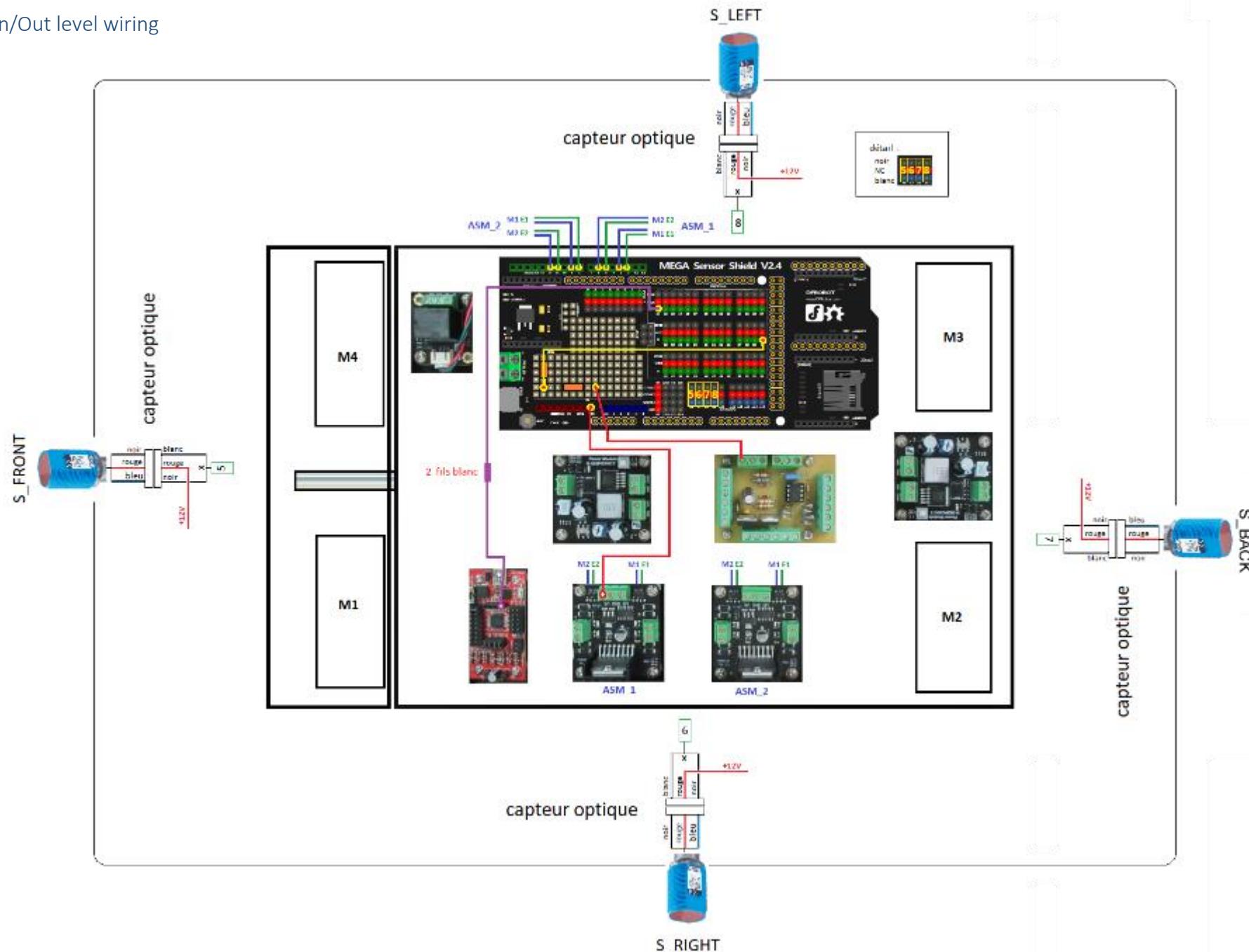
General overview

The following diagrams show the entire electrical set-up of the robot. It allows to understand the operation of the robot in a global way and to check the wiring once completed.

Power level wiring



In/Out level wiring



Inputs/outputs list :

This list can also be retrieved in the Arduino program header :

```

Pin 0: NC
Pin 1: NC
Pin 2: (E1 ASM 1) PWM wheel Front Right
Pin 3: (M1 ASM 1) DIR wheel Front Right
Pin 4: NC
Pin 5: (E2 ASM 1) PWM wheel Back Right
Pin 6: (M2 ASM 1) DIR wheel Back Right
Pin 7: NC
Pin 8: (E1 ASM 2) PWM wheel Back Left
Pin 9: (M1 ASM 2) DIR wheel Back Left
Pin 10: NC
Pin 11: (E2 ASM 2) PWM wheel Front Left
Pin 12: (M2 ASM 2) DIR wheel Front Left
Pin 13: NC
Pin 14: Serial 3 for Arduino Servo controller
Pin 15: NC
Pin 16 : (Internal) RX Carte bluetooth (serial 2)
Pin 17 : (Internal) TX Carte bluetooth
Pin 18 : (4 motor 1)Encoder signal B wheel Front Right
Pin 19 : (4 motor 2)Encoder signal B wheel Back Left
Pin 20 : (3 motor 3) Encoder signal A wheel Back Right
Pin 21 : (3 motor 4) Encoder signal A wheel Front Left
Pin 22 : NC
Pin 23 : NC
Pin 24 : NC
Pin 25 : NC
Pin 26 : NC
Pin 27 : NC
Pin 28 :
Pin 29 :
Pin 30 : Dock station IR detection front right
Pin 31 : (3 motor 1) Encoder signal A wheel Front Right
Pin 32 : (3 motor 2) Encoder signal A wheel Back Left
Pin 33 : (4 motor 3) Encoder signal B wheel Back Right
Pin 34 : (4 motor 4) Encoder signal B wheel Front Left
Pin 39 :
Pin 40 :
Pin A0 : Battery Voltage Pin
Pin A6 : Proximity sensor Front
Pin A7 : Proximity sensor Left
Pin A8 : Proximity sensor Back
Pin A9 : Proximity sensor Right

M1 Red wire: ((+)1 ASM 1)
M1 black wire: ((-)1 ASM 1)
M2 Red wire: ((+)2 ASM 1)
M2 black wire: ((-)2 ASM 1)
M3 Red wire: ((-)1 ASM 2)
M3 black wire: ((+)1 ASM 2)
M4 Red wire: ((-)2 ASM 2)
M4 black wire: ((+)2 ASM 2)

```

Use of the electrical terminals (blocks)

For the assembly, use the electrical terminals (gray and orange). A terminal block of this type is used to put in common all the wires inserted therein. To connect a wire to a terminal block, check that the wire is stripped about 1cm, open the orange tab and push the wire to the bottom. Close the tab (be careful not to pinch your fingers).



In order to insert the cable, first ensure that the cable is stripped. Open a clip, insert the cable and then close it again. Note that the clip can be quite difficult to open.



Wire's color code:

It is important to comply with the following table for the color of the wires.

Item	Ground	+	data
Obstacle sensors	Blue	Brown	Black
Servomotor tilt	Brown	Red	Orange
Chassis	Black	Red	Other color

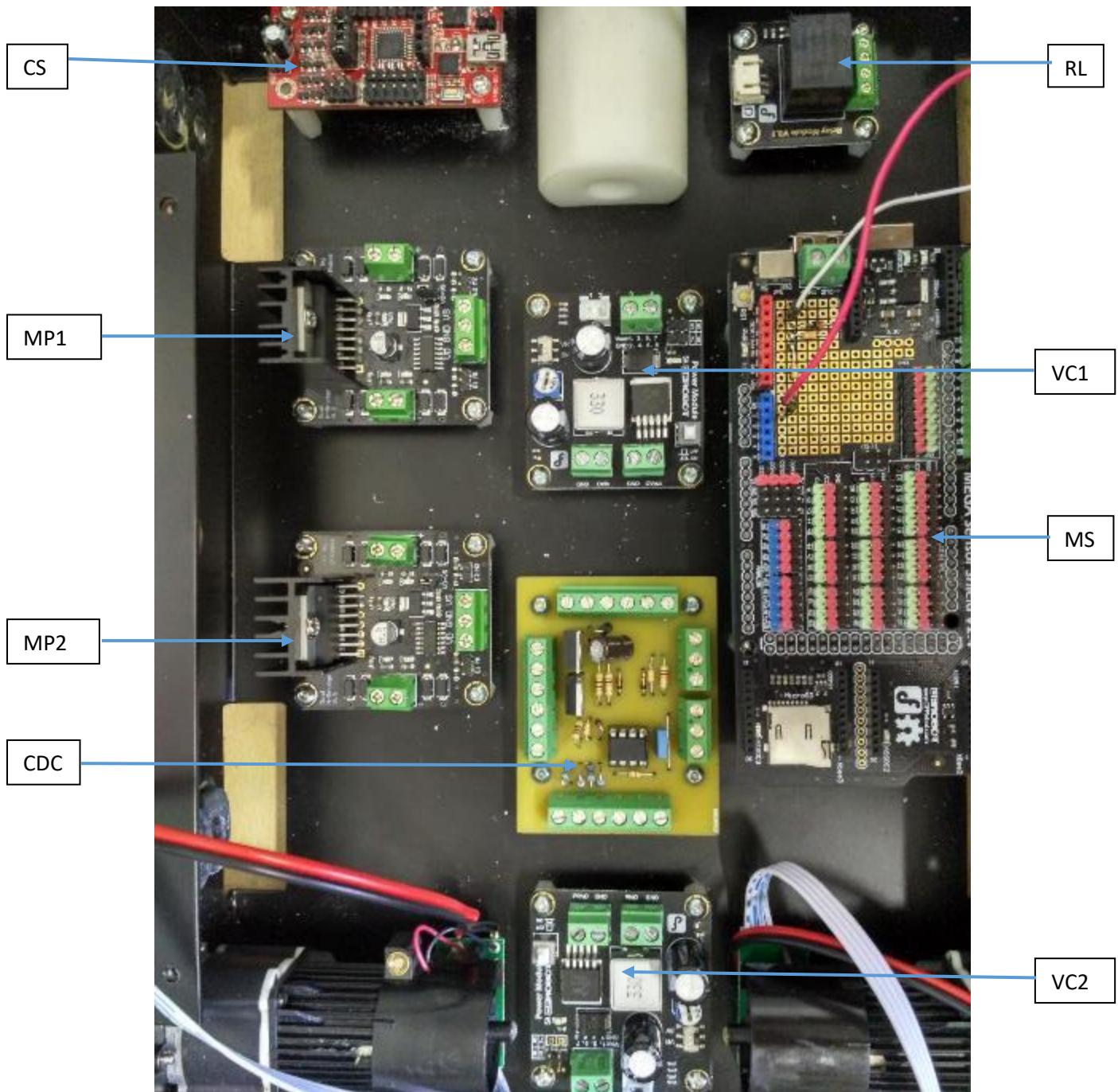
Caution: Do not turn on the main power button (position pressed) until after the "test" phase. The entire wiring must be checked beforehand, a bad connection could have irreversible effects on certain elements.

For electronic wiring, the following items are required:

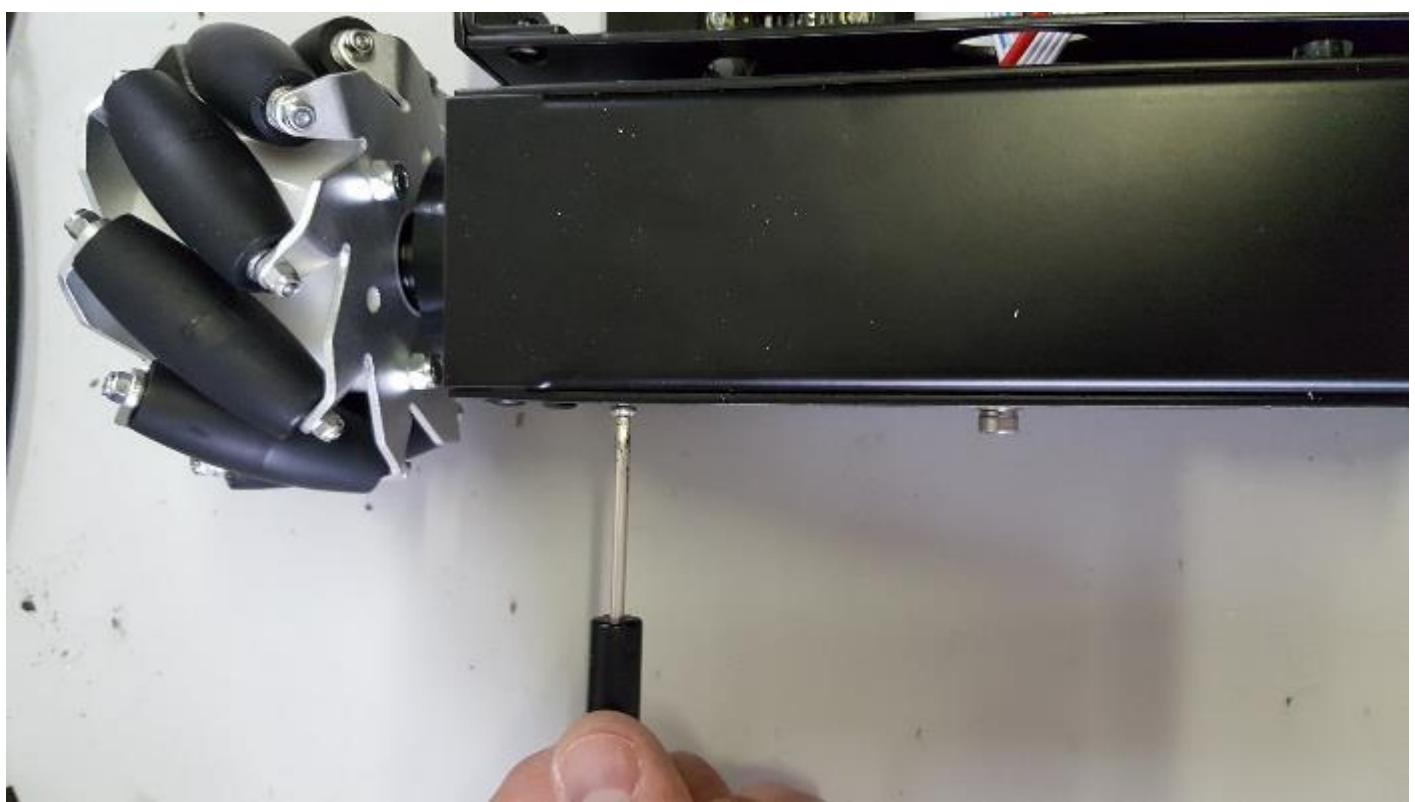
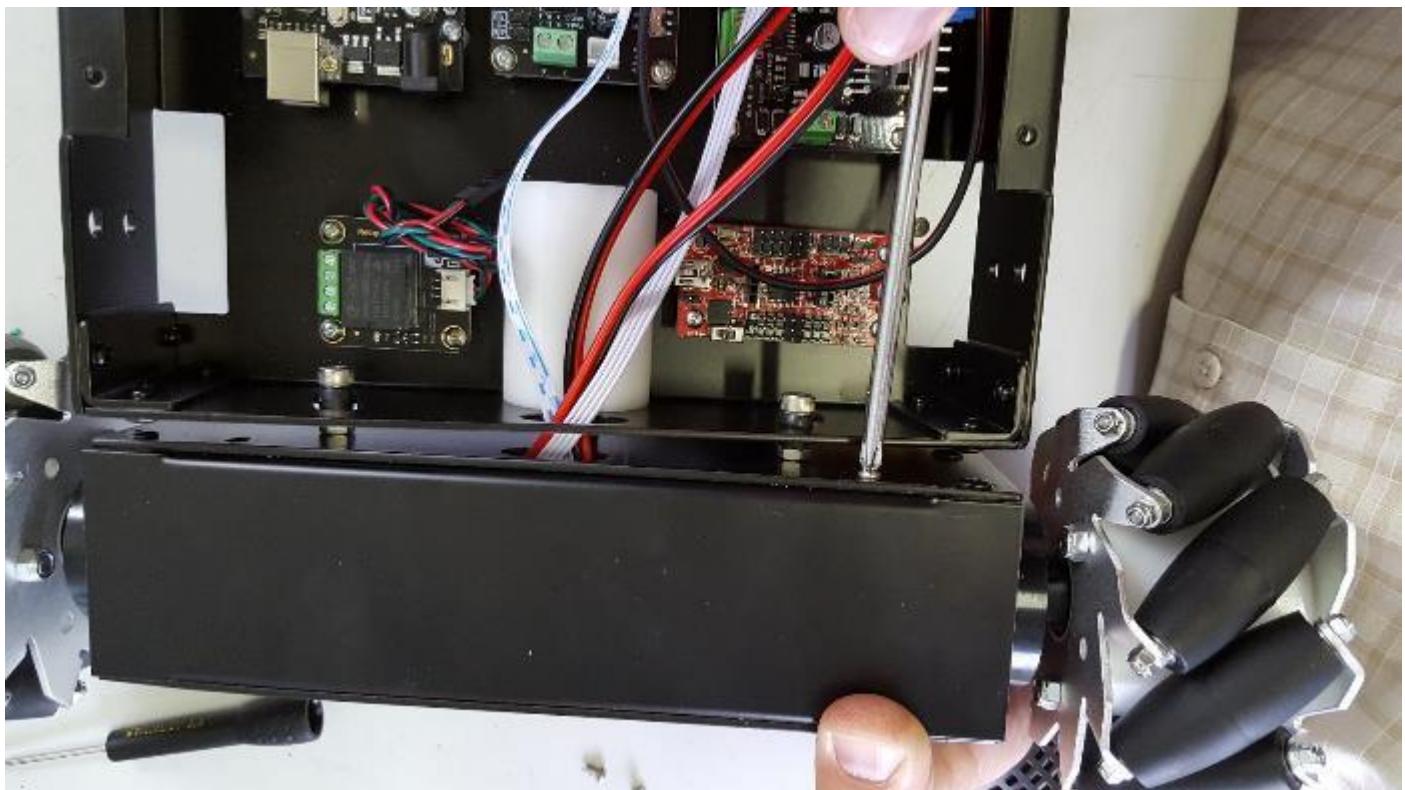
- - 4 terminals with 5 connections (W2 & W3 for ground, W1 for + permanent 12V, W4 for temporary +12V)
The permanent +12V is connected directly to the battery and if it is connected to the charger. The temporary

+12V is not connected to anything when the button is off, and it is connected to the permanent +12V when the button is pressed.

- 1 terminal (block) of 3 (W5 for the temporary +5V)
- 2 terminals (blocks) of 2 (W6 one for the wire of the power button, W7 for the data wire of the servomotor.)



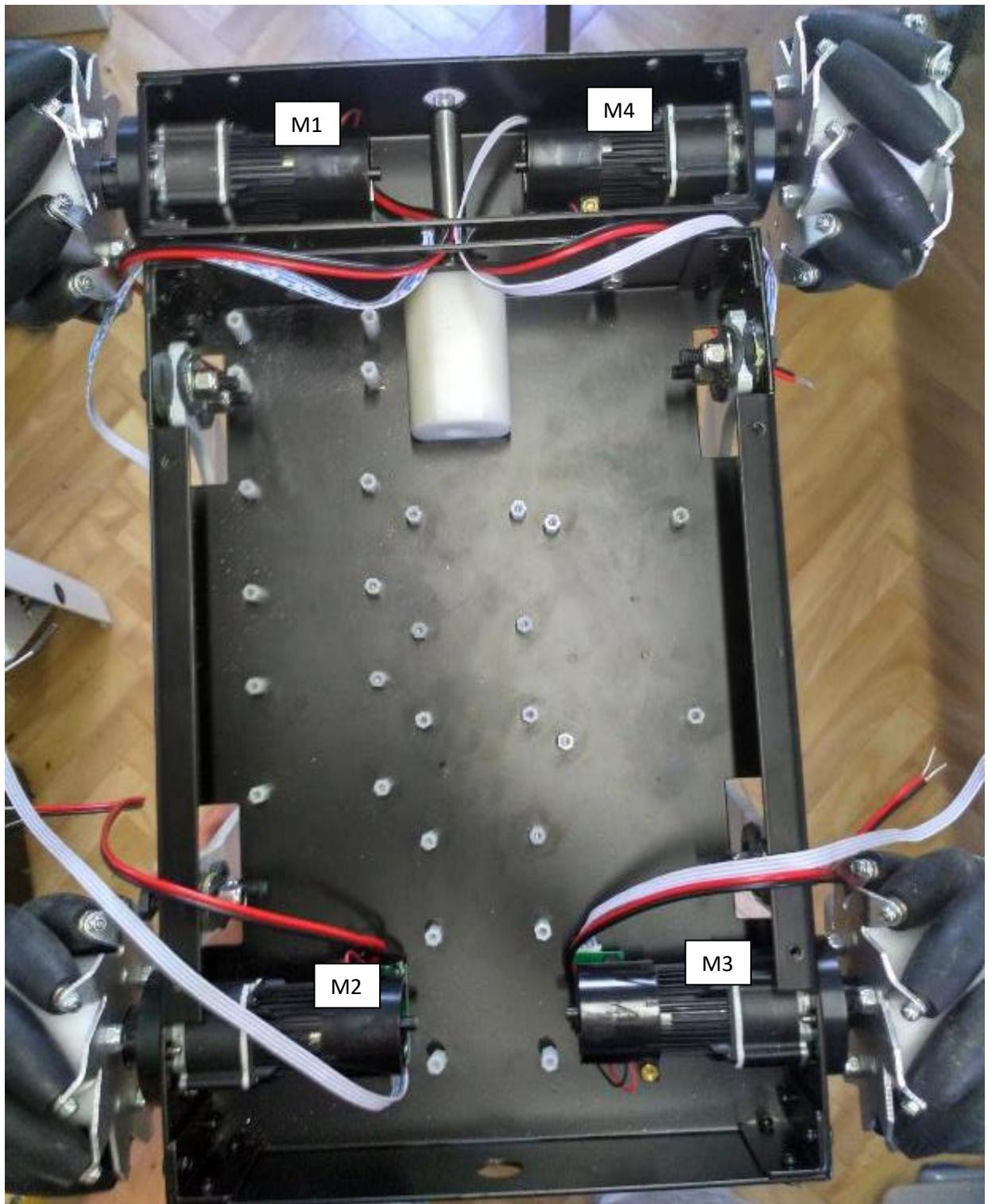
Before starting the wiring, remove the rectangular plate at the front of the chassis. To do this, simply fasten the 4 fixing screws.



Motors electric wiring

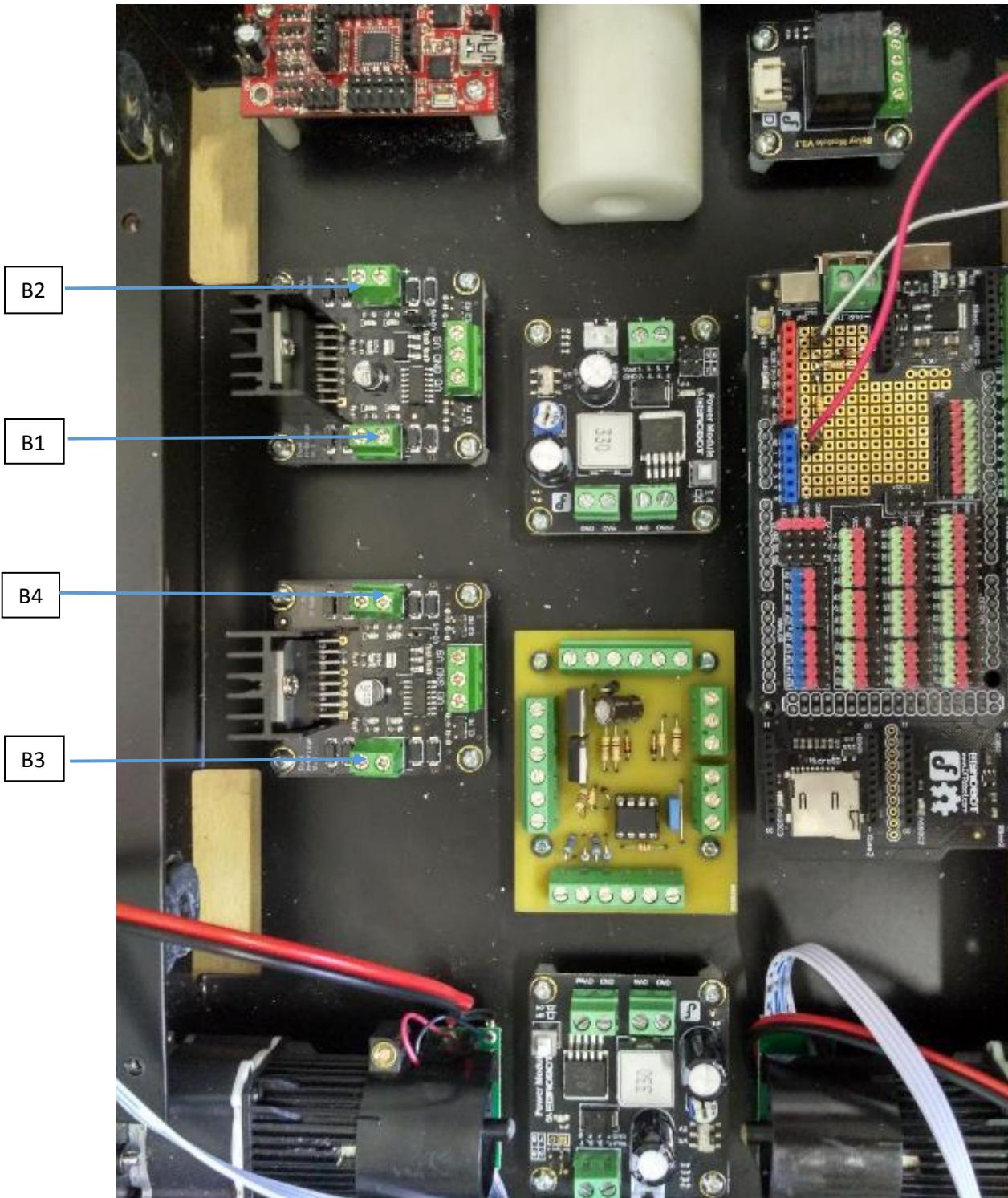
As shown in the picture below, motors 1 and 4 are at the front. They are to be connected to the ASM1 and ASM2 servo boards so that ASM1 controls the M1 & M2 motors, and ASM2 controls M3 & M4.

Caution: Due to a problem on some series, left and right can be reversed on chassis. Seen from above, the M1 is always the front right engine and M4 the front left engine. Seen from below, it is therefore the reverse:



Wire the motors according to the table below.

Motor	Red wire	Black wire
M1	+ of B1 terminal	- of B1 terminal
M2	+ of B2 terminal	- of B2 terminal
M3	- of B3 terminal	+ of B3 terminal
M4	- of B4 terminal	+ of B4 terminal

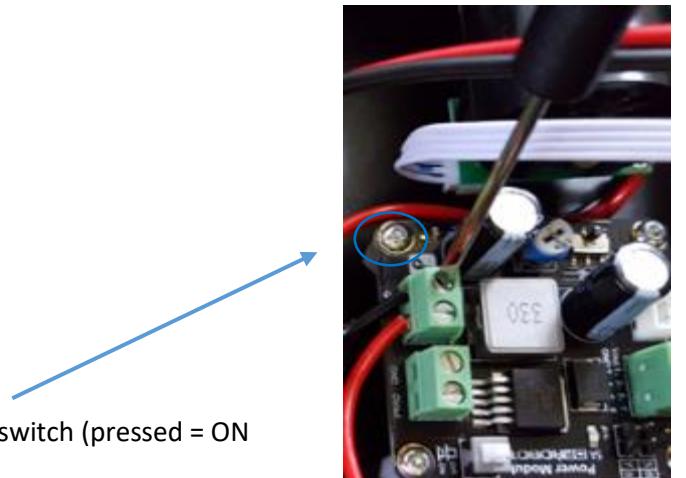


Wiring the power supply :

Adjustment of the 12V voltage conversion board

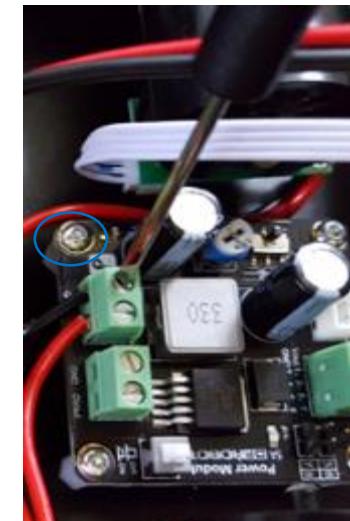
First of all, the voltage converter [VC2] must be adjusted. It will receive power from the battery (14.8V at nominal) and distribute 12V:

Take one of the two supplied battery cables and connect it to the Ovin (red wire) and GND (black wire) pins on the [VC2] board located between the 2 rear motors.

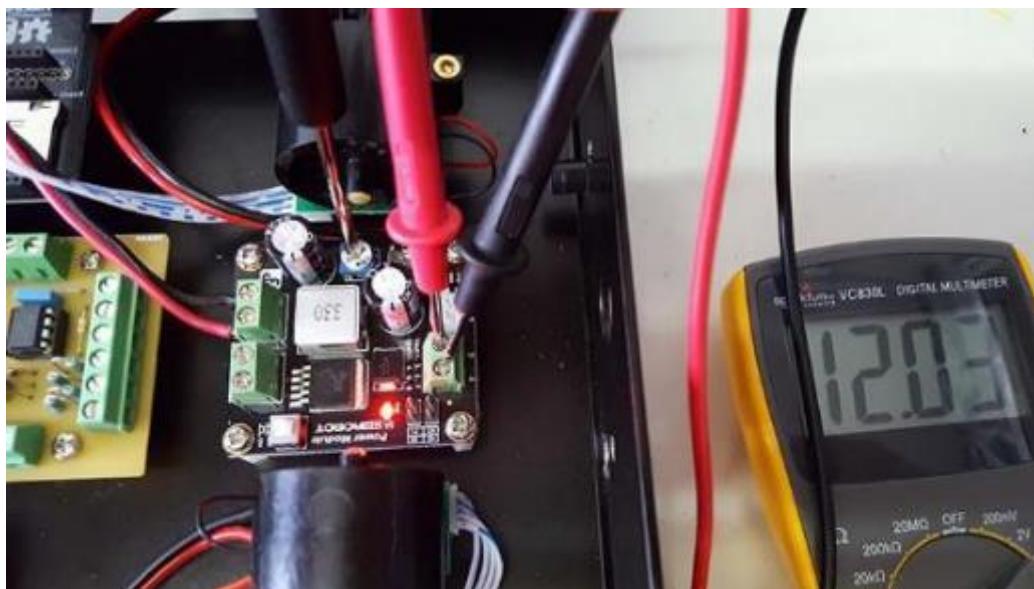


Position the [VC2] board switch on VR. Press its white switch (pressed = ON position) to activate the board.

Then connect the battery to the cable:



Position the multimeter pins on the OVout terminals on the [VC2] board, the red on the 3 and the black on the 4.



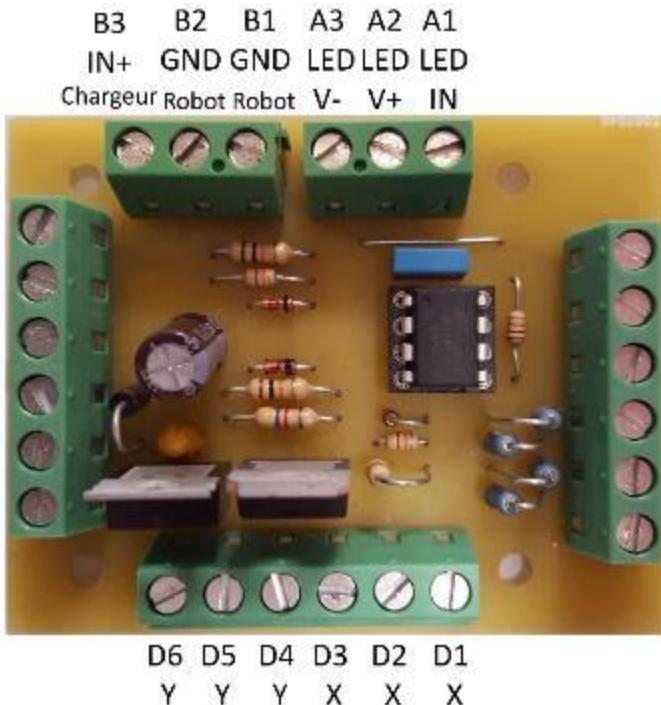
All that remains is to adjust the potentiometer to reach 12V displayed on the multimeter.

Caution: The tuning of the potentiometer is very fine ...

Once the potentiometer is set, disconnect the battery and the cables used for this operation.

Wiring the charging board (CDC):

The pin assignment of the charging board [CDC] is as follows:

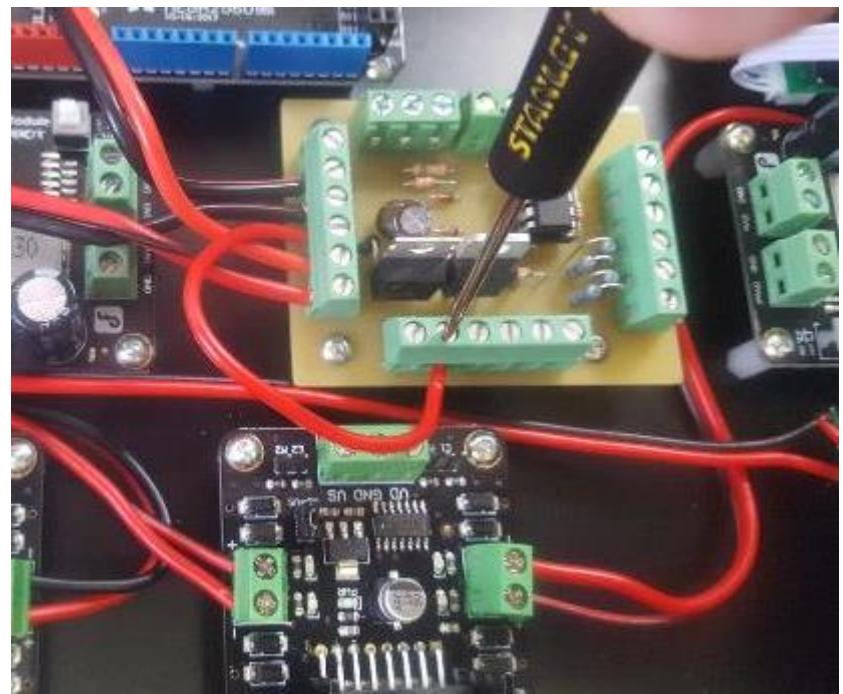


E6 GND Robot
 E5 GND Robot
 E4 GND Robot
 E3 OUT Arduino VBat
 E2 IN Switch
 E1 OUT Switch



Wire the "power management board" cable : connect the red wires to C1, C2 or C3 and the black wires to C4, C5 or C6.

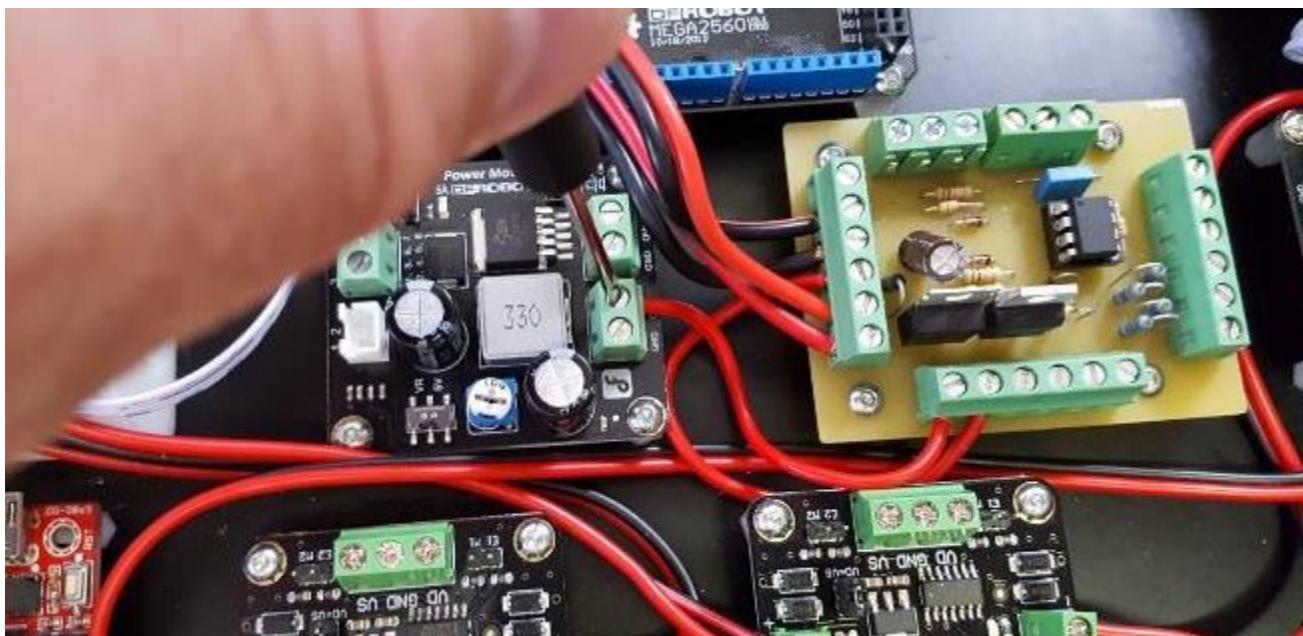
Cut a small red wire (about 7cm) to connect it to the last free BAT + and connect it to terminal D5.



With another small red wire, connect the Ovin terminal on the [VC1] board to the D6 terminal on the [CDC] board.

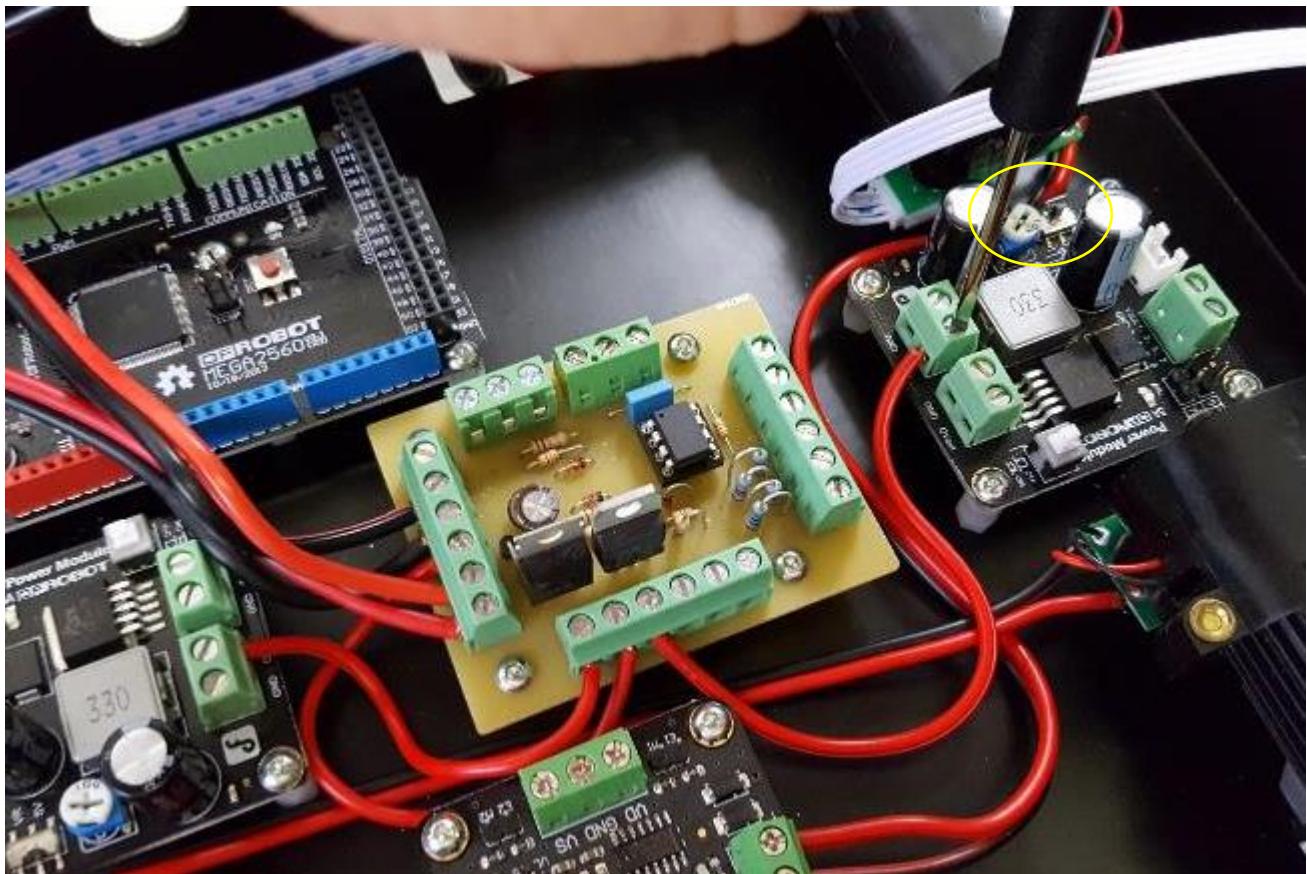
Set the small 5V / VR switch of the voltage converter [VC1] to 5V. (Reminder: In VR position, the output voltage is adjustable using the potentiometer from 0V to 12V. Be sure to check the correct position of the switch in order to avoid overvoltage).

Press its white switch (pressed = ON position) to activate the board.

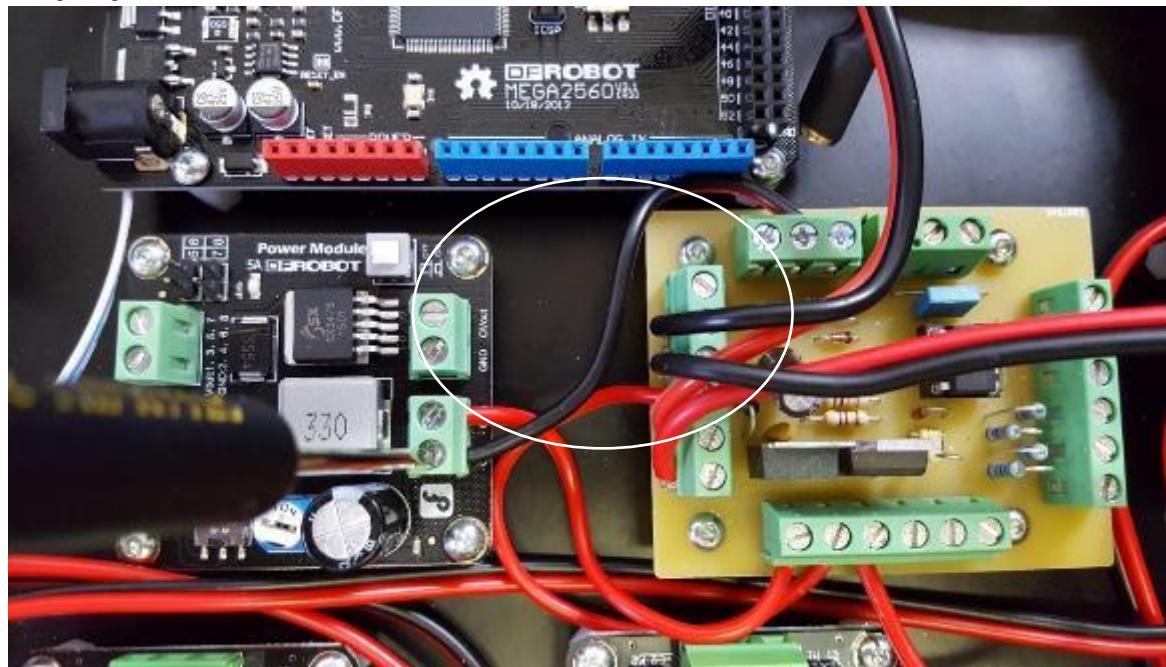


Connect a red wire, which you have previously cut to a length of 10cm, from terminal D4 of the CDC board to the Ovin terminal of the board [VC2].

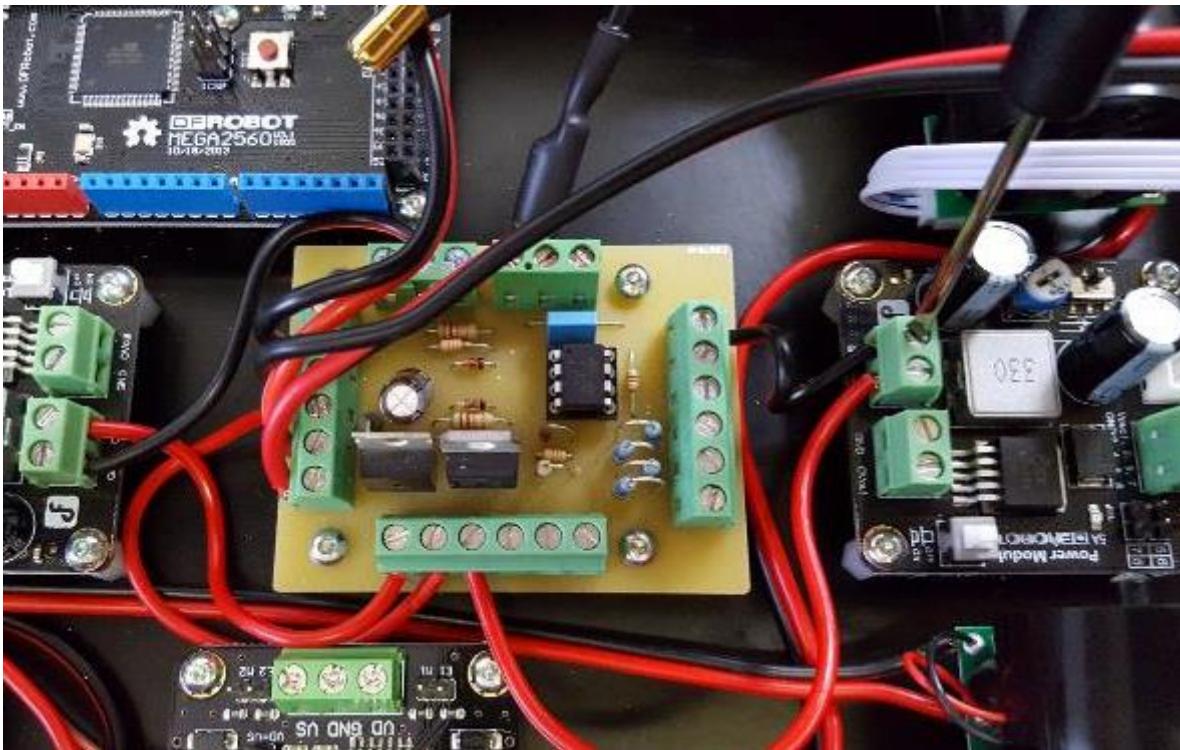
If you have set the [VC2] board to 12V, the switch must be set to VR and the small white switch is pressed (= ON position) to activate it.



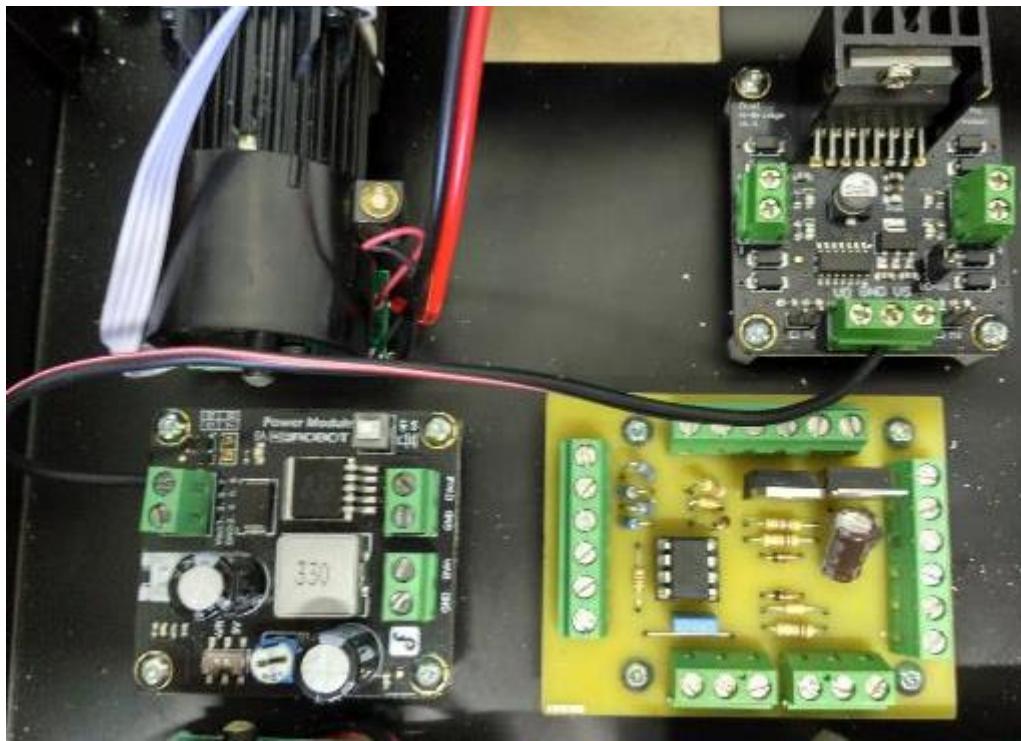
Now connect a black wire (about 7 cm) to the GND terminal next to the Ovin pin where we plugged the red wire into the [VC1] board and connect it to terminal B2 on the CDC board.



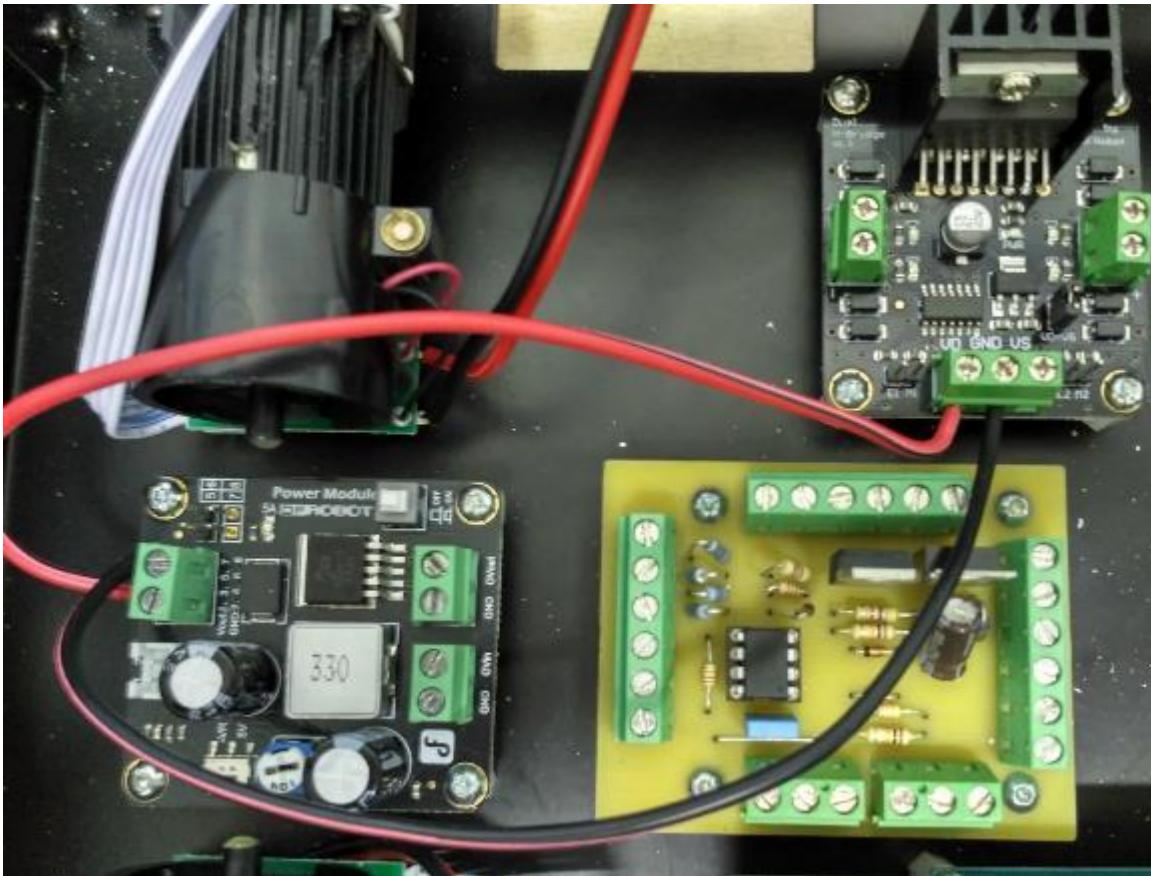
Now connect a black wire, previously cut to the length of 4cm between E6 of the CDC board and the GND terminal located next to Ovin where we plugged the red wire on the [VC2] board.



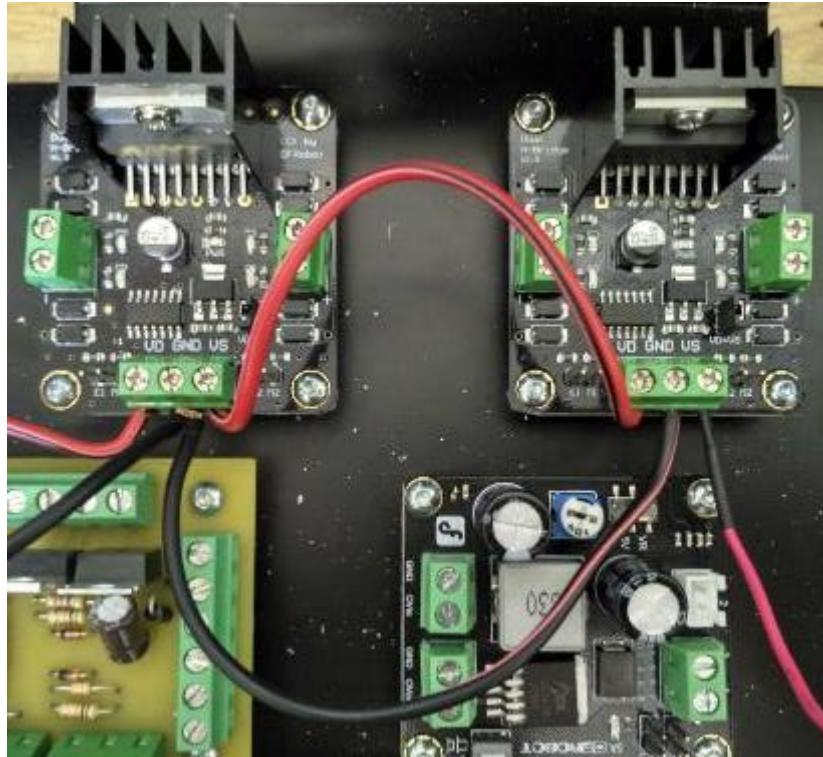
Connect a black wire (about fifteen centimeters long) from terminal 4 of the [VC2] board to the GND terminal of [MP2].



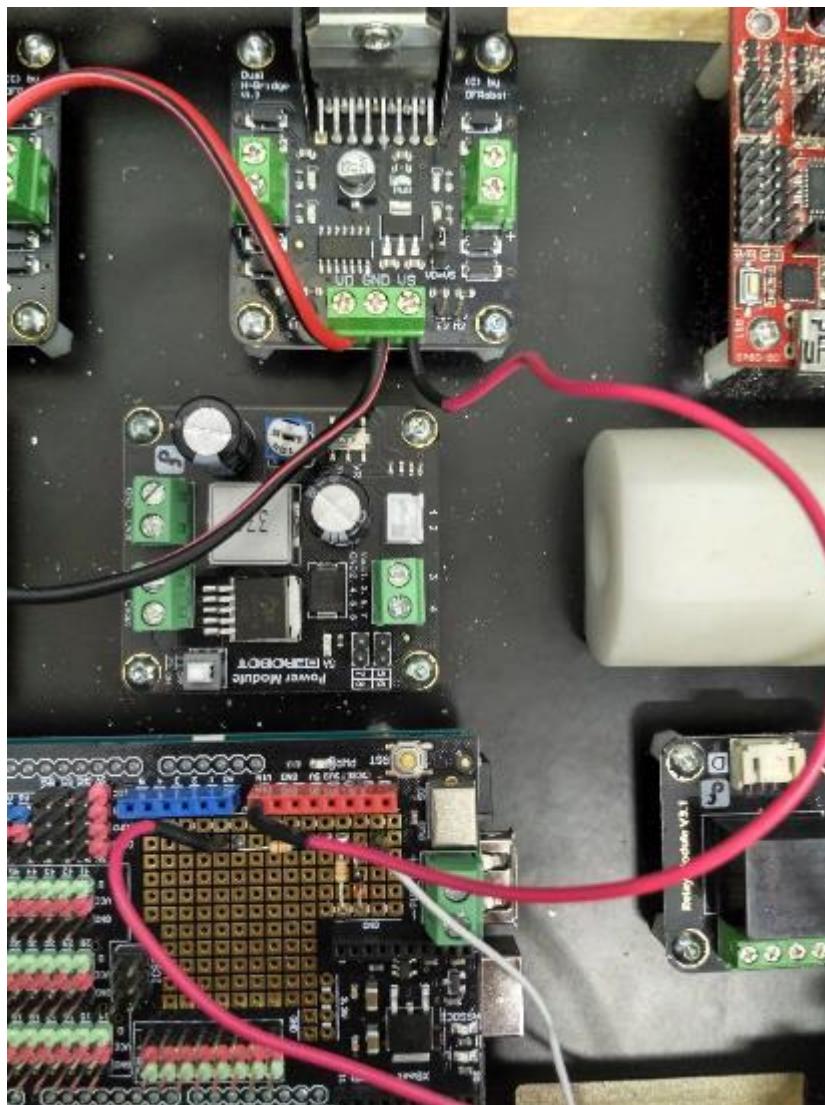
Connect a red wire from terminal 3 on the [VC2] board to the VD terminal on the [MP2] board.



Connect a second black wire from the GND terminal on the [MP2] board to the GND terminal on the [MP1] board, and then a red wire from the Vs terminal on the [MP2] board to the VD terminal on the [MP1] board.



Connect a male / male red wire supplied from the VS terminal on the [MP1] board to the Vin terminal on the [MS] board in order to power the Arduino board at 12V.



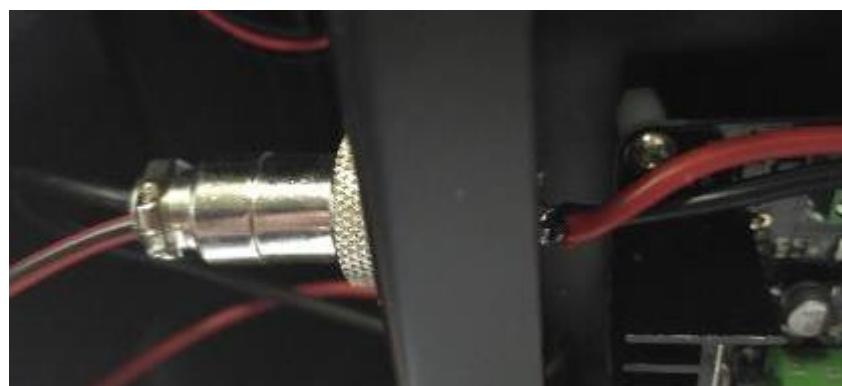
Now connect the black wire of the charging cable to the COM terminal of the relay module [RL] and then connect the red wire of the same cable to a 3-way gray / orange terminal block.



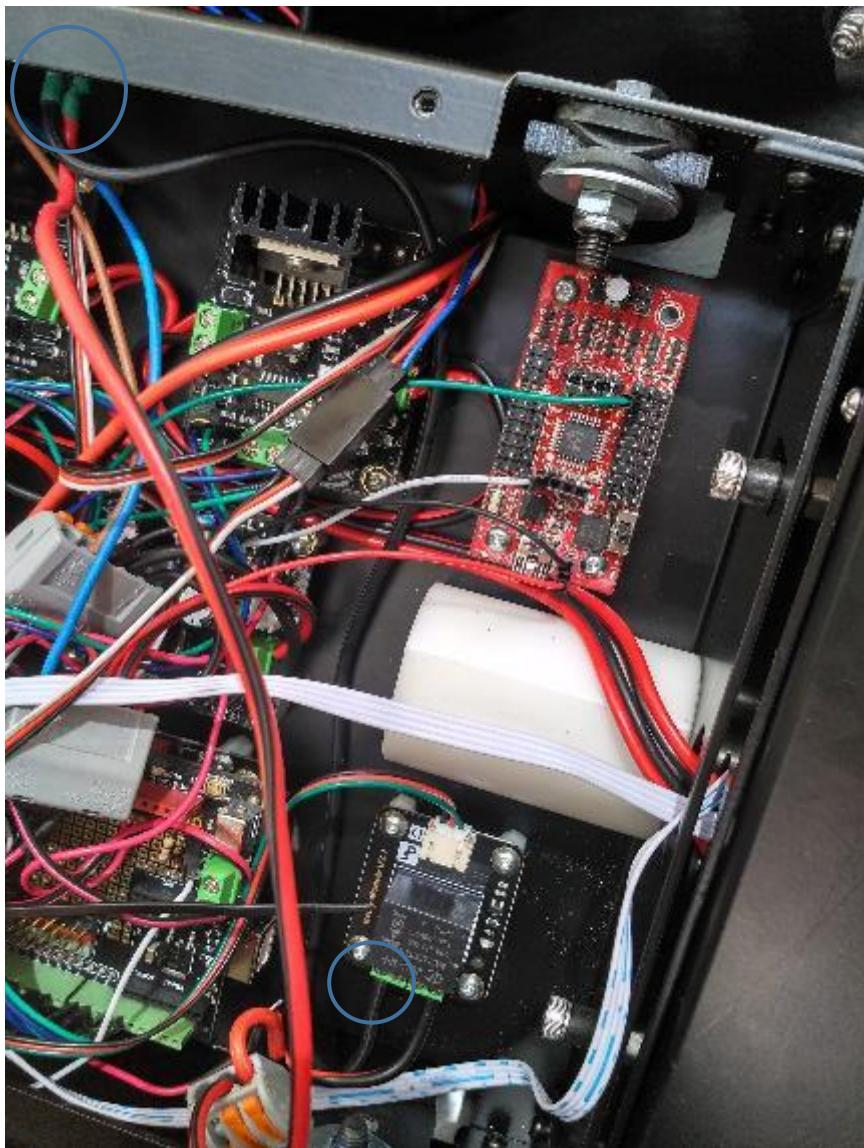
Insert the 3-pin male charging connector into the chassis intended hole on the side of the 2 [MP1] and [MP2] boards and insert it through the outside of the chassis and tighten in the washer.



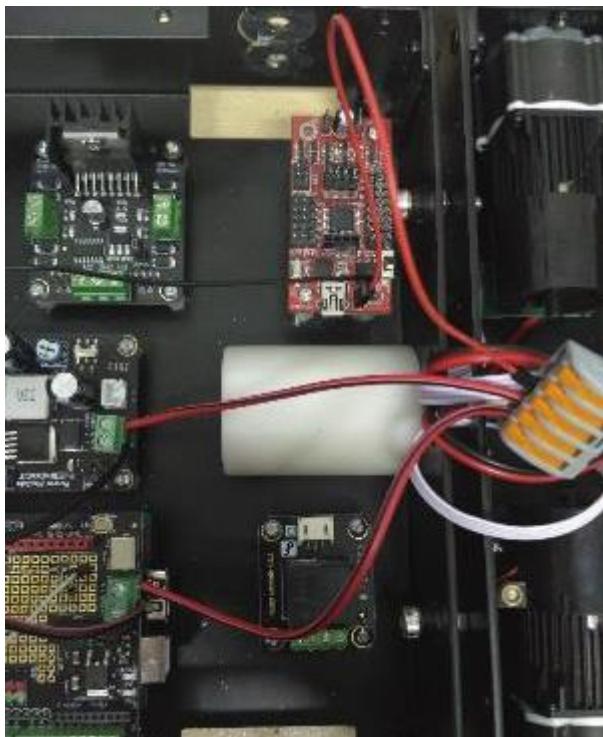
This connector allows, to connect the power supply unit of the supplied charger for recharging the robot .



Now connect the black wire connected to the connector that has just been attached to the chassis to the NC terminal of the relay module [RL] and then put the red wire in the terminal block where the other red wire is already located.

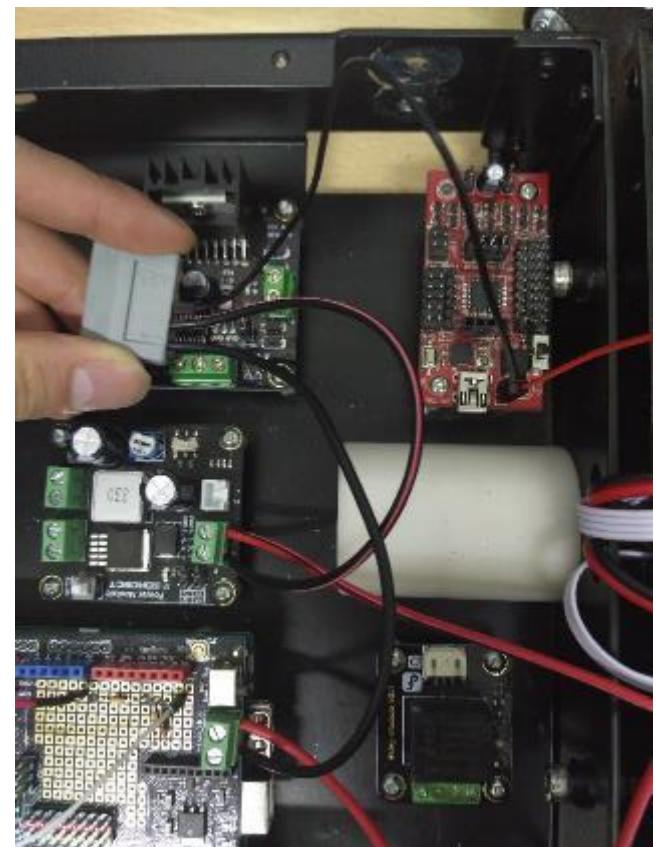


Connect a male / male red wire from the terminal (block) to B3 on the [CDC] board, also welding the male red wire on the arduino shield to B3 on the [CDC] board.



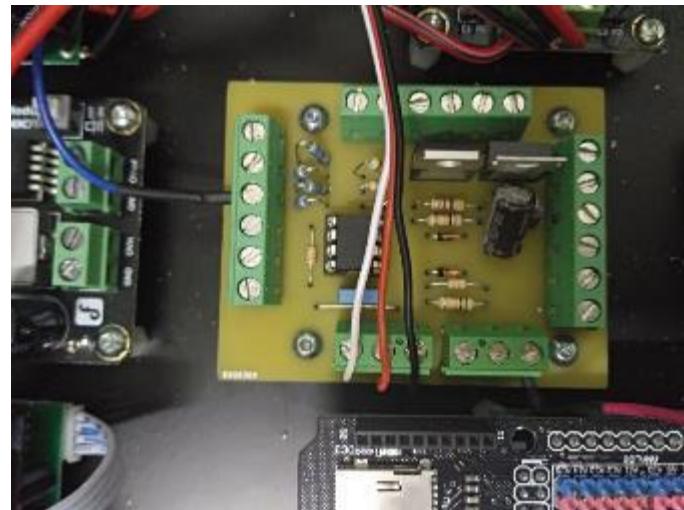
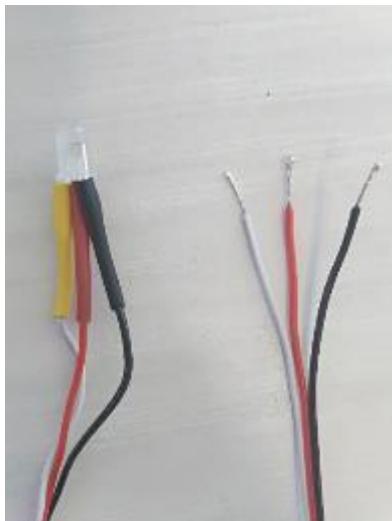
For the next wiring step, take a 5-pin terminal (block) and some red wire.

Connect a red wire to the + of the green PWR terminal of the Arduino board shield, another one to the 3 of the [VC1] board and a third one to the + of the red Arduino mini card and put these 3 wires into the 5-pin terminal block.



Connect a black wire to the - green PWR terminal block of the Arduino board shield, one on the 4 of [VC1] and one on the - of the red Arduino mini board.

Connect the led that gives the battery status of the robot. If it is green, the battery is charged, if it is red, the battery is discharged and if it is blue, the battery is charging.



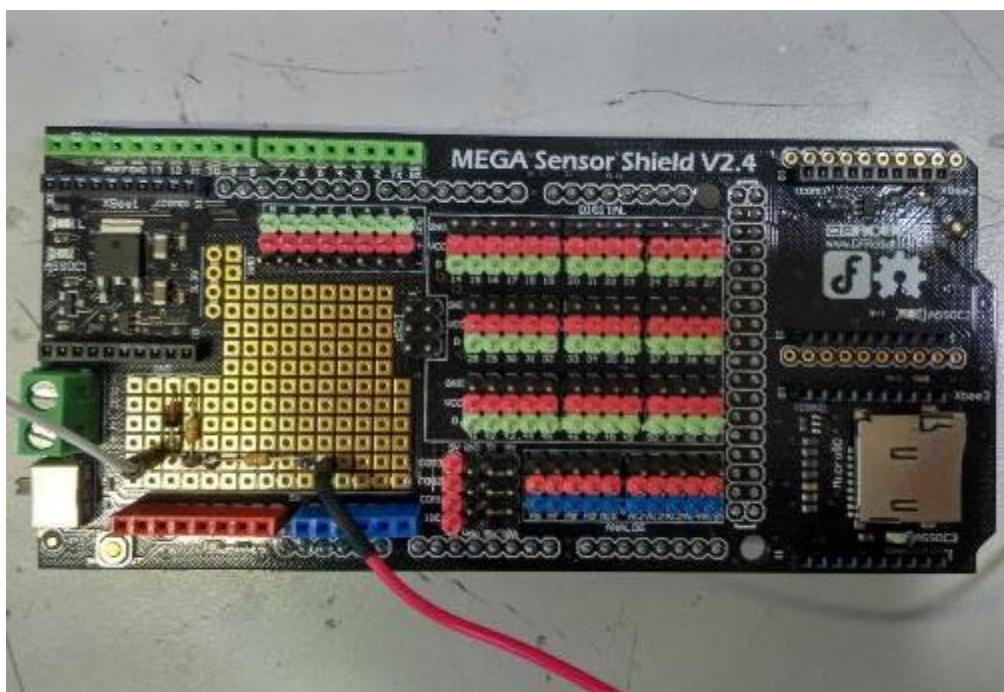
The LED must previously be soldered on 3 wires to be connected to the [CDC] board: the white wire on terminal A1; the red wire on terminal A2 and the black wire on terminal A3.

The whole assembly allows the Arduino Mega to be powered by the + 12V for its own operation and the + 5V feeds the various elements that will be connected to the red and black pins of the extension shield (MS).

The motor power boards are supplied with 12V (check that the jumper VD = VS is present on each of the boards [MP1] and [MP2]). It connects the two inputs VD and VS, which will simplify the wiring. In the same way as for the Arduino Mega, an internal regulator takes care of limiting the voltage to 5V for the logical part of the card. The extension Shield has a small 5V / PWR switch. It must be in the PWR position to convey the voltage supplied to it by the 12V / 5V converter.

Wiring of the signals inputs/outputs:

Here is the extension shield of the Arduino Mega facilitating its connectivity .



On each card [MP], there are E1 M1 and E2 M2 pins



For the [MP1] board, connect the E1 pin to pin 2 of the Arduino shield using the male / female blue wire and then the M1 pin to pin 3 of the Arduino shield using a green male / female wire.

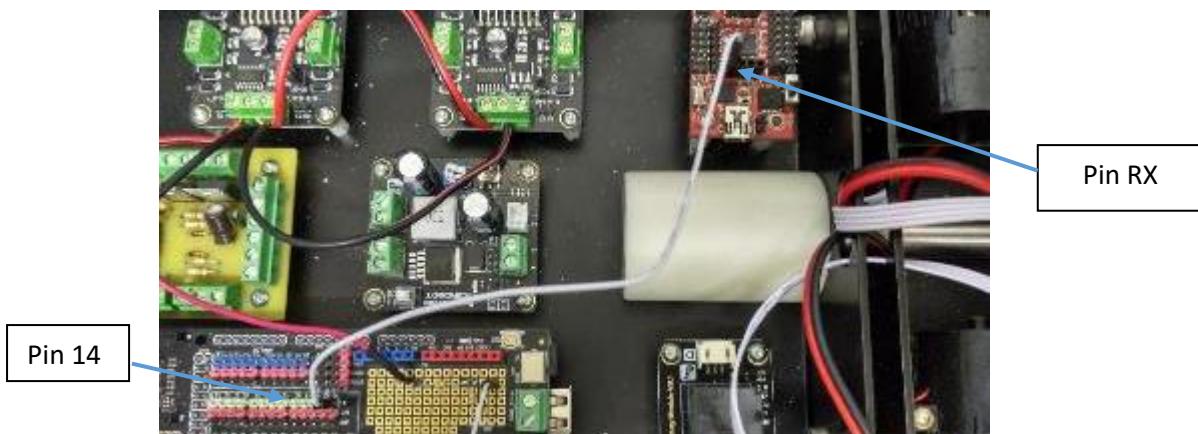
For the [MP1] board, connect the E2 pin to pin 5 of the Arduino shield using the male / female blue wire and then M2 pin to pin 6 of the Arduino shield using a green male / female wire.

For the [MP2] board, connect the E1 pin to pin 8 of the Arduino shield using the male / female blue wire and then M1 pin to pin 9 of the Arduino shield using a green male / female wire.

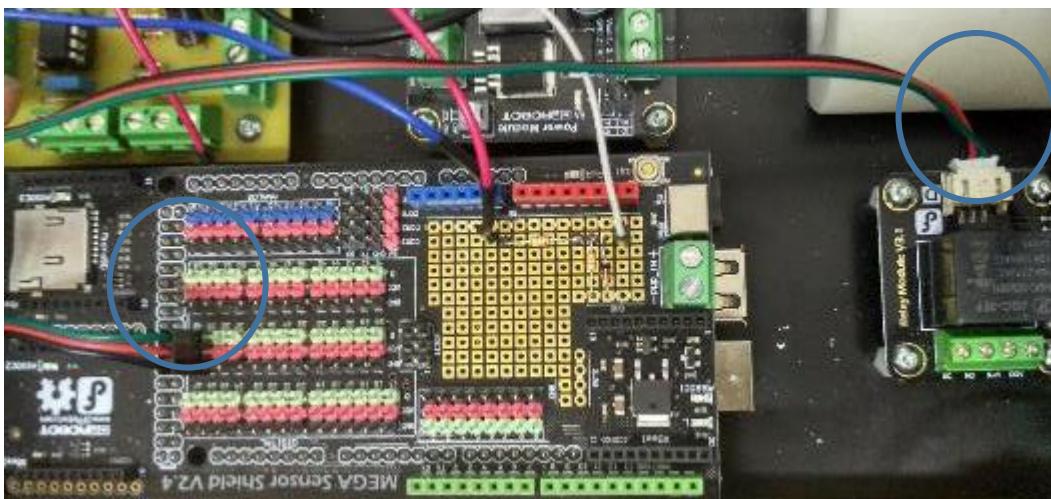
For the [MP2] board, connect the E2 pin to pin 11 of the Arduino shield using the male / female blue wire and then M2 pin to pin 12 of the Arduino shield using a green male / female.

Connect pin 14 from the Arduino Mega to the mini Arduino red board (RX: pin to the left of the socket)

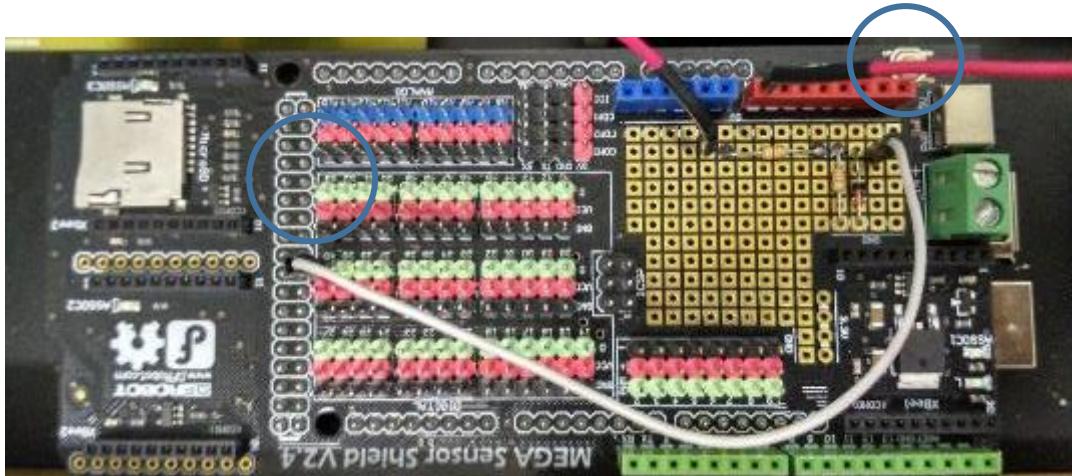
| Pin 14: serial 3 for Arduino Servo controller



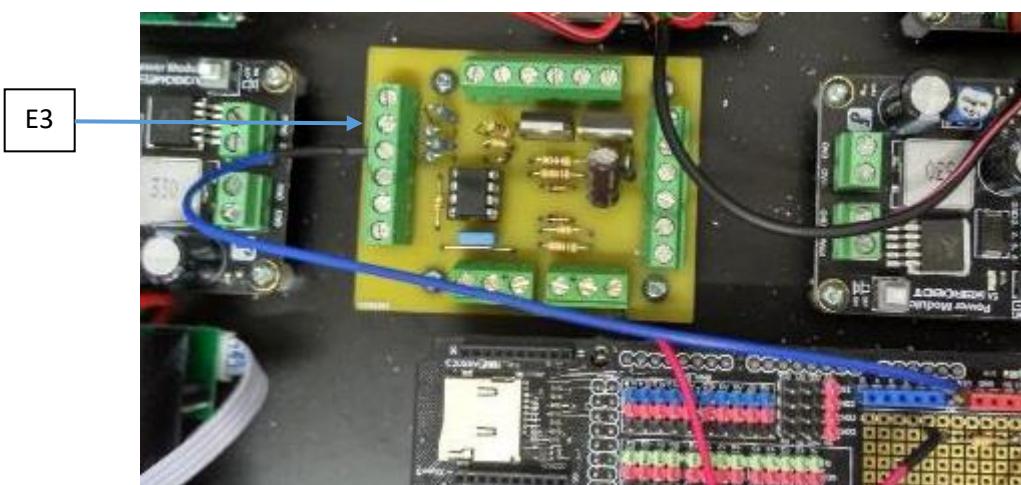
Connect the pin 39 (with its power supply) to the relay module, respecting the color code green, red, black



Connect the wire coming from the small assembly made on the hole plate of the Arduino shield to the pin 40 if not already done



Now connect A0 pin with E3 terminal in the [CDC] board



It is now necessary to wire the motor encoders (speed indicator of the motors) and thus allow the Arduino Mega to control the 4 motors independently (closed loop control).

Warning ! If the power supply cables are reversed, the encoders will be destroyed when the voltage is switched on.

Each encoder is composed of 4 wires each having its own utility (5V, GND, life signal A and B).



For the 4 encoders the wires are in the following order:

- The wire being closest to the wheel is for the 5V (It is connected to a red pin of the Arduino)
- The 2nd wire is for the ground (It is connected to a black pin of the Arduino)
- The 3rd wire is the encoder signal A (It is connected to a green pin of the Arduino)
- The 4th wire is the encoder signal B (It is connected to a green pin of the Arduino)

Note that the fault-proof coding patterns on the wires are never the same on the motors.

For the motor # 1:

- Connect the wire closest to the wheel (hence the 5v) to the Arduino shield at red pin number 18.
- Connect the 2nd wire (for the ground) to the black pin number 18.
- Connect the 3rd wire (signal A) to the green pin number 31.
- Connect the 4th wire (signal B) to the green pin number 18.

For the motor # 2 :

- Connect the wire closest to the wheel (hence the 5v) on the Arduino shield to the red pin number 19.
- Connect the 2nd wire (for the ground) to the black pin number 19.
- Connect the 3rd wire (signal A) to green pin number 32.
- Connect the 4th wire (signal B) to green pin number 19.

For the motor # 3:

- Connect the wire closest the wheel (hence the 5v) on the Arduino shield to the red pin number 20.
- Connect the 2nd wire (for the ground) to the black pin number 20.
- Connect the 3rd wire (signal A) to the green pin number 20. (Note: pins are reversed compared to motors 1 & 2)
- Connect the 4th wire (signal B) to green pin number 33.

For the motor # 4:

- Connect the wire closest to the wheel (hence the 5v) to the red pine number 21 on the Arduino shield.
- Connect the 2nd wire (ground) to the black pin number 21.
- Connect the 3rd wire (signal A) to the green pin number 21. (Note: pins are reversed compared to motors 1 & 2)
- Connect the 4th wire (signal B) to the green pin number 34.

Set-up of the obstacles sensors:

Place the 4 distance (obstacle) sensors, one on each side. On the sides they should be placed on the lowest hole, at the back in the eccentric hole, and on the front, on the only existing hole. If you chose the pack with the charging station an ultrasonic sensor replaces the infrared sensor at the rear. **To install it, refer to the instructions of the charging station.**

To have obstacle detection of approx 20 cm range, the adjustment screw must be in the position shown in the picture below. The detection range can be adjusted from 1 to 40 cm depending on the needs.

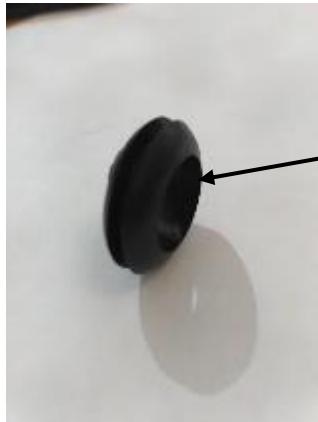


Once the sensor is set, screw the nut onto the sensor .

Then insert the sensor into the hole inside-out of the shell, put the black plastic cover on the outside and tighten the nut.



Then place the 3 rubber cables in the remaining holes of the chassis (top holes on the sides and center hole at the rear).



Rubber cable
grommet

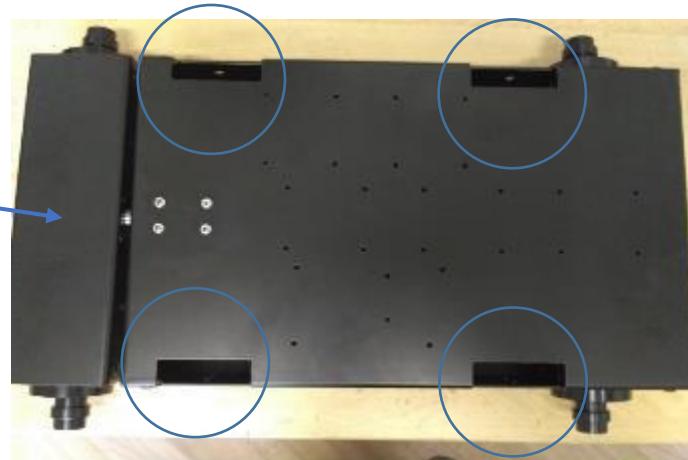


Finally insert the studs into the cover edge grommets.

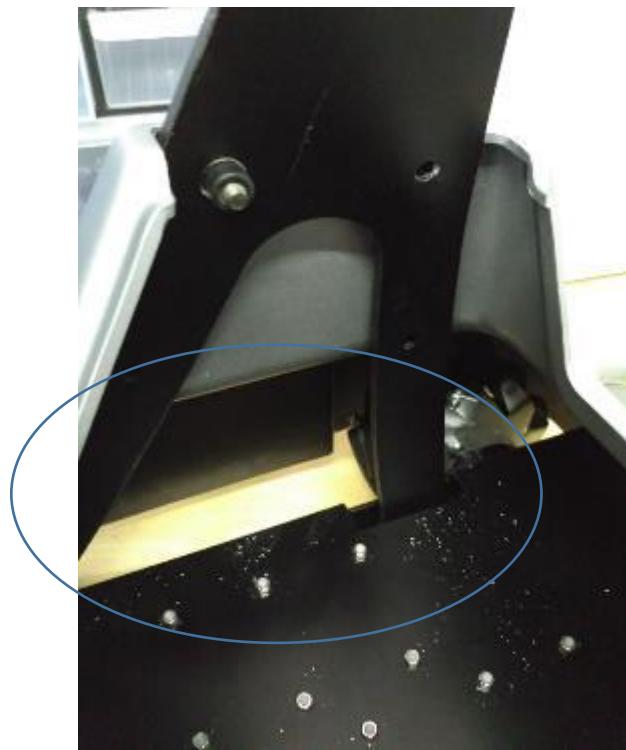


Mast assembly

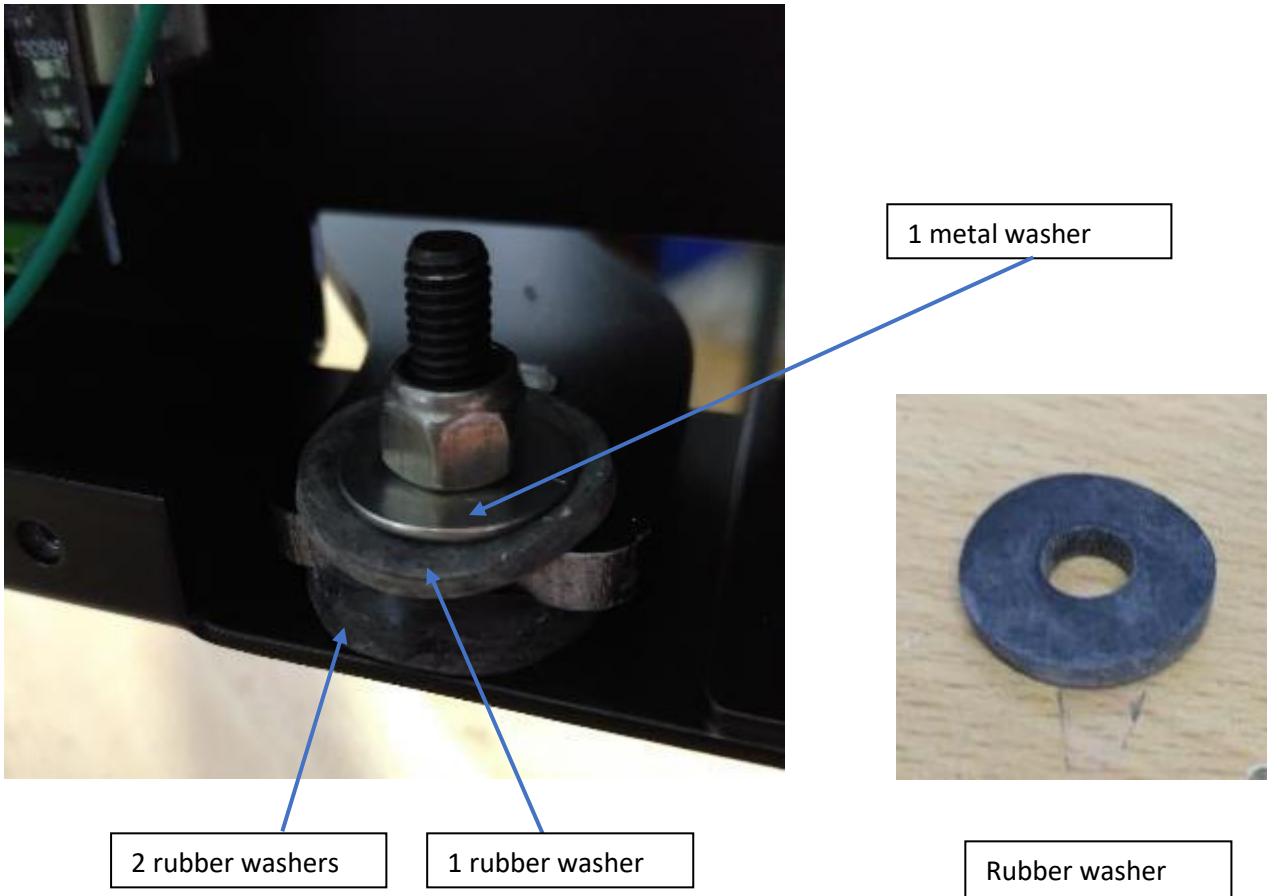
The main cover assembly consists initially in the assembly of the frame with the mats. Start by sliding one of the masts into the frame in the rectangular openings provided for this purpose..



The hollow of the curvature of each rod must be oriented towards the front of the robot and the fold inwards allowing the 2 rods to join.



To attach each rod to the chassis, two rubber washers are required on the inside of the mast and one on the outside to limit vibration. To facilitate mounting, glue the washers together so that it does not move, fasten tight only once the set of screws, nuts and washers are properly positioned.

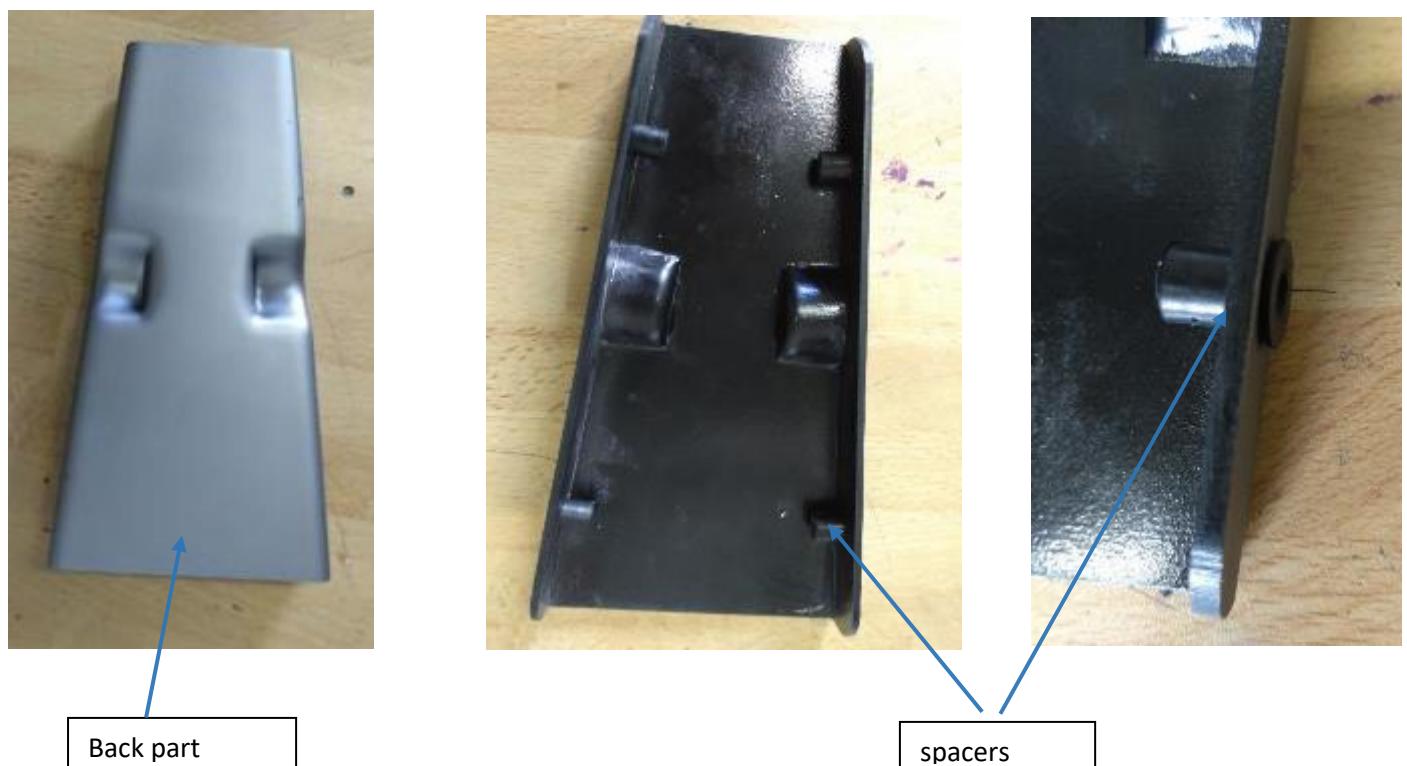


Repeat same process for the second rod .

Central (main) part asembly

The central part is composed of 2 trapezoidal parts which fit together .

Take the smallest part (rear part) and insert an M4 rubber insert into each hole as shown in the picture.



Slot the rear part into the front part.

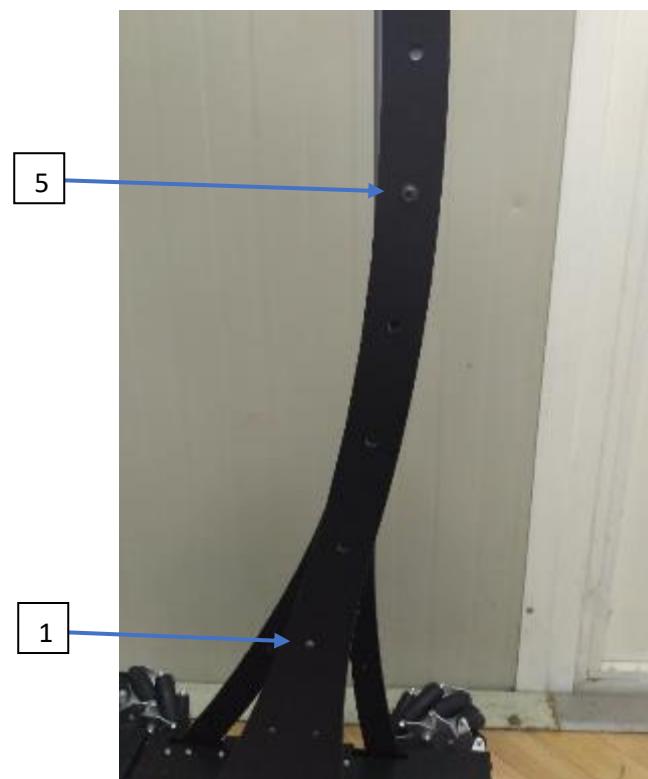


Front part



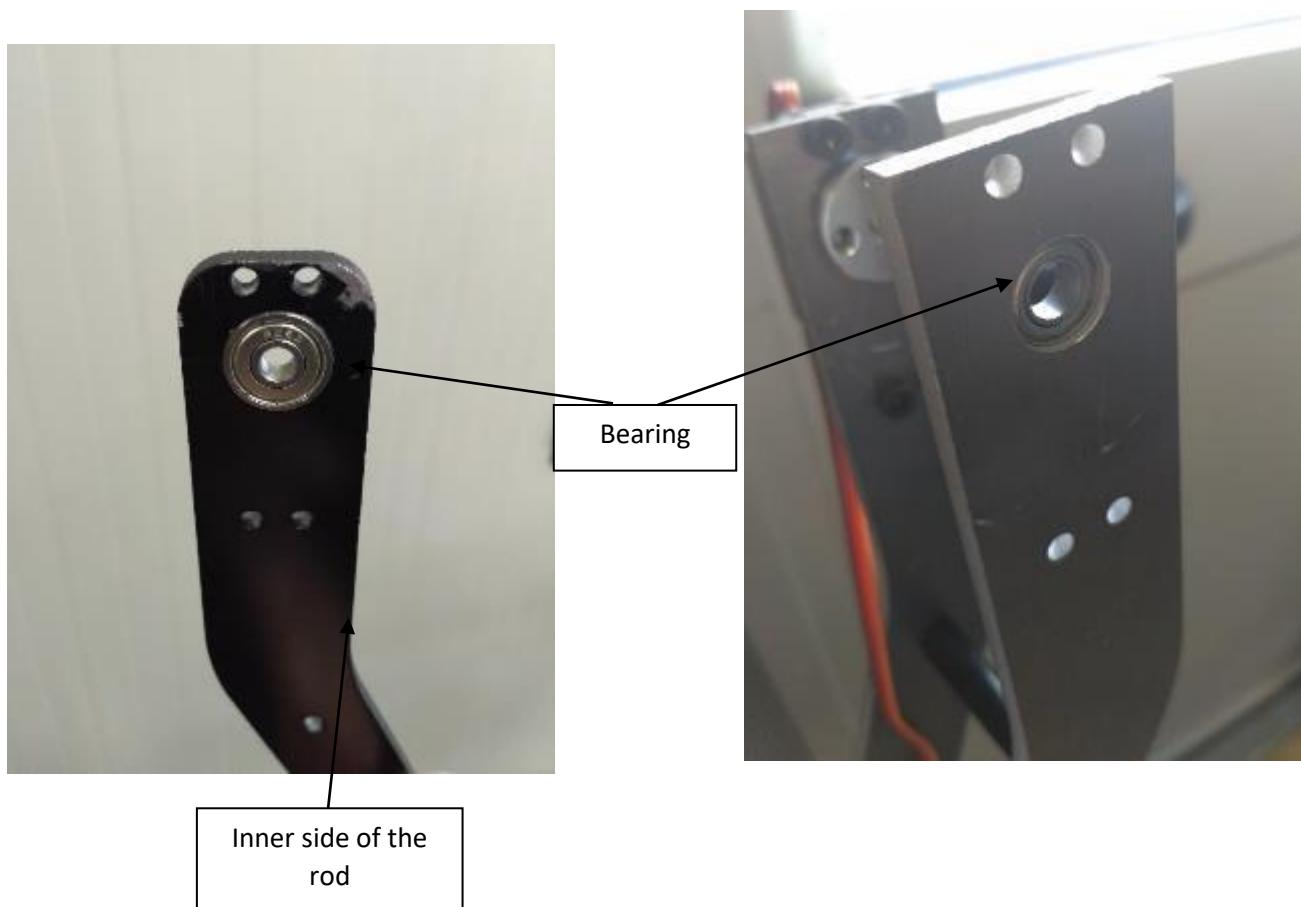
Slotted parts

Put the assembly part between the masts and place it in such a way as to have the bottom holes at the fifth hole of the rods starting from the bottom. Screw the assembly with 4 M4 screws.



Installing the head Tilt assembly

Insert the bearing on the right rod of the robot, flange inside.

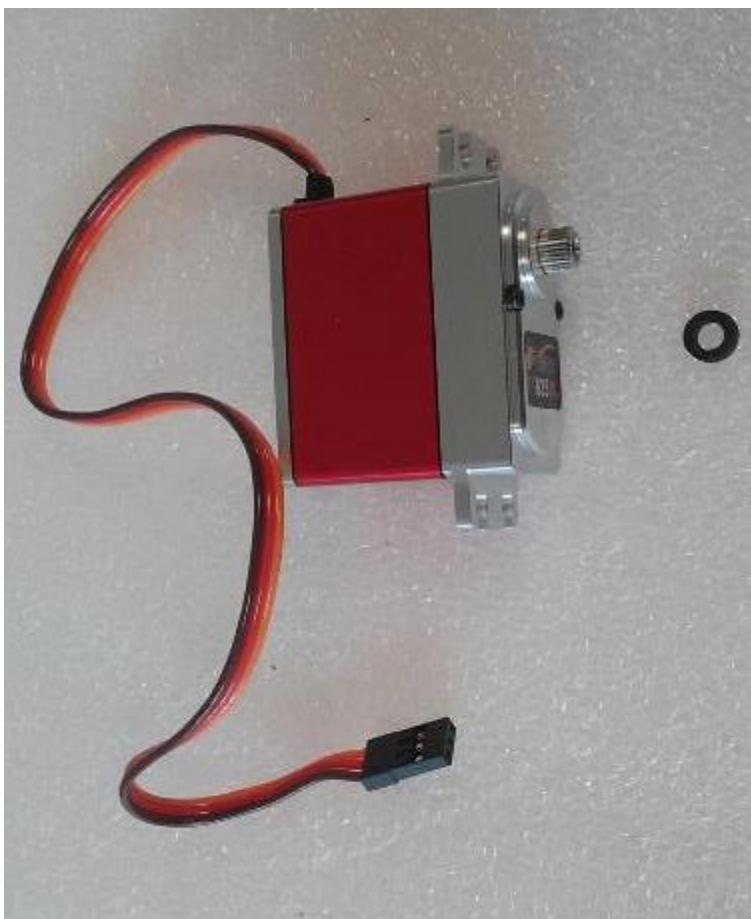


Screw the 8mm nylon spacers as follows:

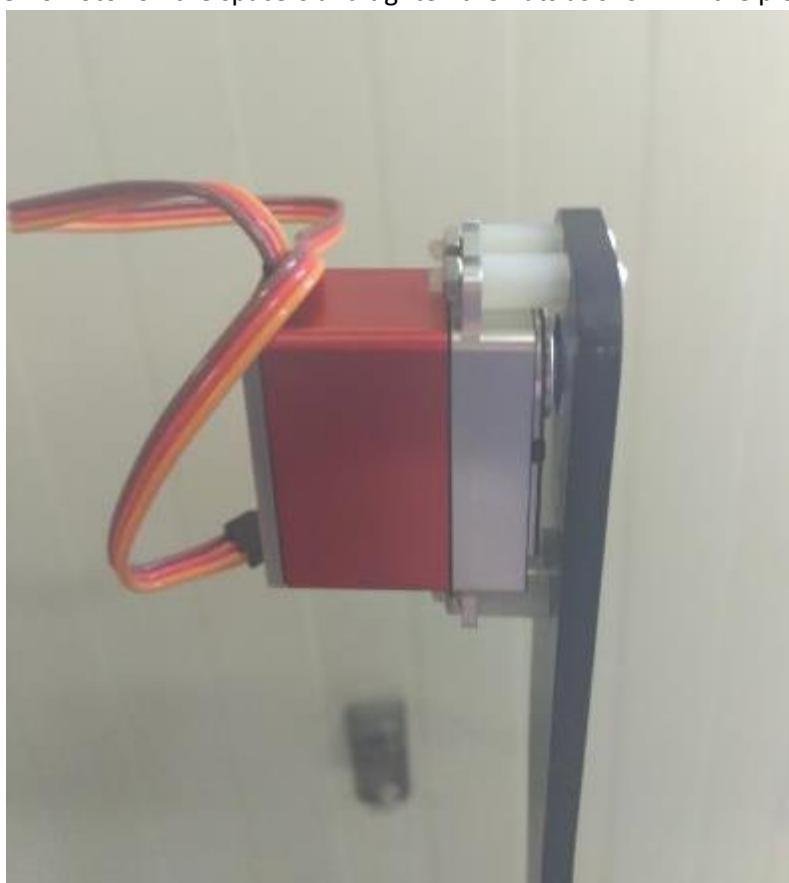
Use the BHC M3 * 12 screws instead of the small screws provided in the spacer bag.



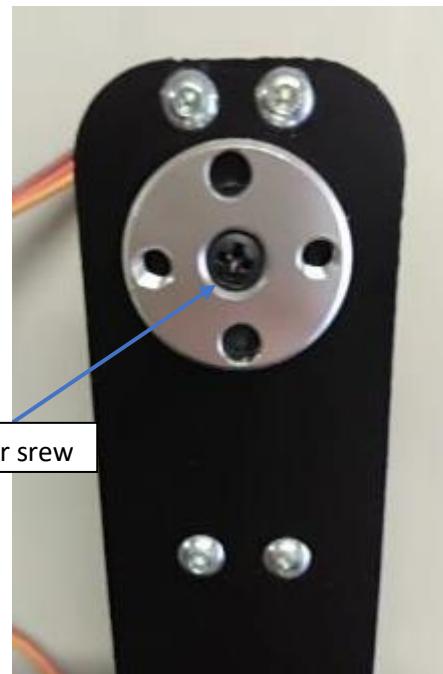
Place the rubber washer M3 on the servomotor axis.



Place the servomotor on the spacers and tighten the nuts as shown in the picture below.



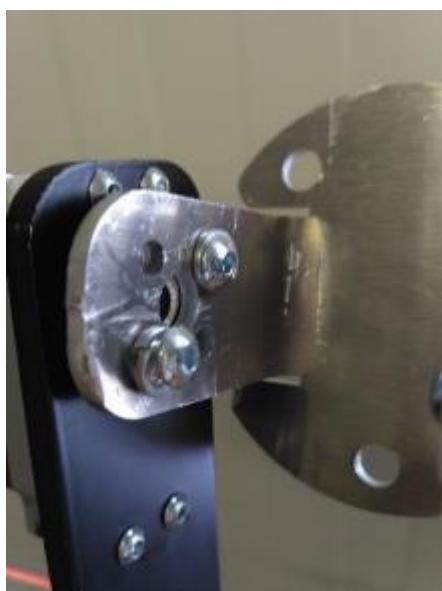
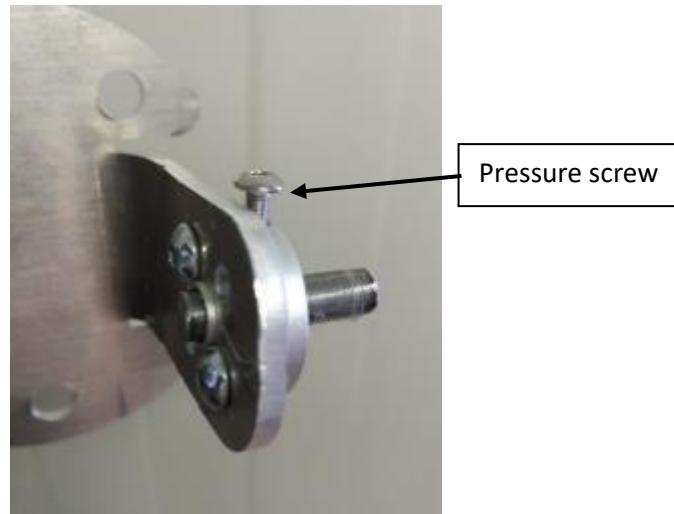
Fit the rudder to the servomotor shaft and screw in the center screw.



Fit the 2nd rudder onto the U-shaped part and screw in from inside with the 2 US screws. The rudder must be positioned as shown in the picture.



Put the small rod and tighten the second rudder pressure screw.



Rotate the servomotor shaft until it stops and screw in as shown in the picture.

Screw the 2 Bhc m4 * 6 screws into their respective holes.

The U must be positioned as shown in the picture (servomotor in abutment).

The lower mobile part can be locked using the padlock. The padlock is left with its cable, which allows you to reuse it elsewhere (for laptops for example). If you want to use it only for the robot, you can cut it at the level of the part holding the cable.



Installing the main on/off switch

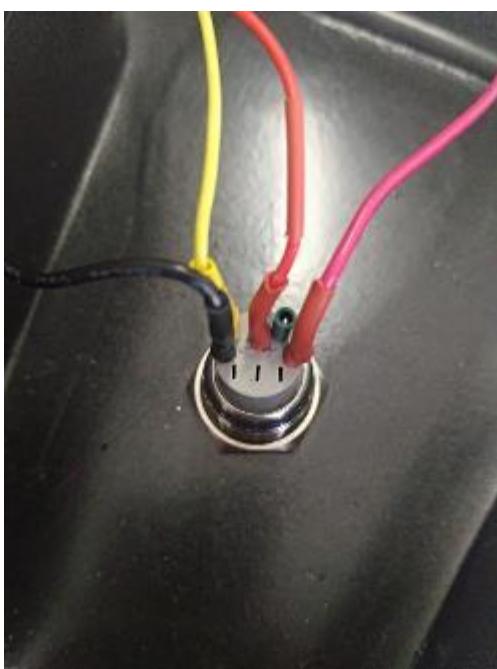
To install the button simply insert it by the outside of the outer part of the head's cover and screw the washer as shown in the picture below.



Servomotor wiring :

For this installation, it is advisable to lengthen the robot on a table.

The switch has 4 wires previously welded, the 2 at the ends (red and black) for the power supply and the 2 on the center for the switch contact (red and yellow).



For wiring it will be necessary to slide down, along the mast, from the head to the chassis, a brown and a blue wire, as well as the big black flat wire including 4 small wires inside.

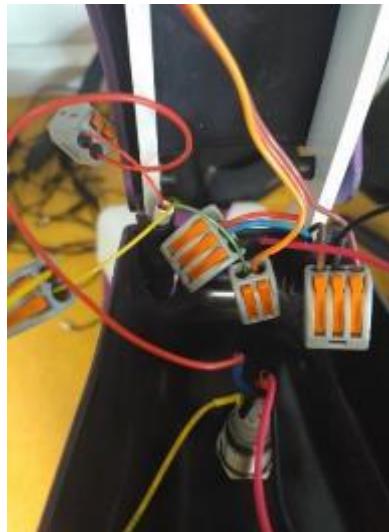


The micro USB cable used to charge the tablet must also be fitted through the hole on the side of the head .

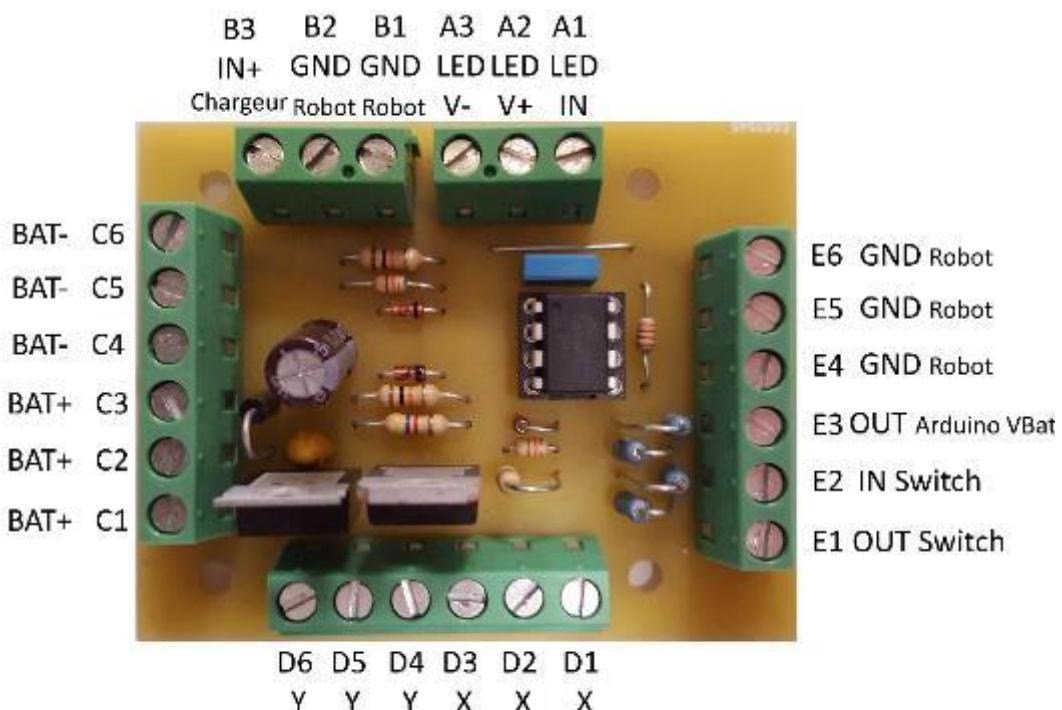
For connecting the wires, follow the below table .

Wires to be connected using terminal block (gray / orange)	Use
Brown wire (mast), big brown (servo motor), black USB wire, Switch LED black wire	Ground (or 0V or GND)
Blue wire (mast), big red (servo motor), USB red wire, Switch LED red "+" wire	+5V
Small yellow wire (mast), yellow wire (switch)	+12V permanent
Small red wire (mast), red wire (switch, "C1")	+12V temporary
Small green, large orange	Data (servo control)

Be careful not to mix up the 2 red wires coming from the switch: the one outside, indicated by a "+", is used for the LED of the switch (+ 5V) and the other, in + 12V is used for the relay switch indicated by "NO" or "C".



Now connect the wires running along the mast to the chassis electronics i.e. a brown wire, a blue wire, and the 3 small wires of the black flat cable. The yellow wire and the red wire are to be wired on the terminals E1 and E2 of the charging board.



The small green wire must be plugged into pin 12 of the red mini Arduino board

The blue wire must be connected to the 5V, i.e. the 5-pin terminal block where the red wires of the Arduino board, [VC1] and the small red card are connected.

The brown wire must be connected to ground, ie to the 5-way terminal block where the black wires of the Arduino board, [VC1] and the small red card are already connected.

Upper part assembly

Place an M4 rubber insert from the outside in the 2nd hole from the top on each of the 2 mast rods.



Then assemble the 2 parts of the head as shown below and screw on each side with an M4 screw.



To finish this assembly it is necessary to put the self-tapping screw. A hole is provided for this purpose at the top of the head. Be careful to position the holes of each part of the cover in front of the other before screwing.



Finishing the mast

Put the supplied rubber sleeves on each of the rods, from the head to the robot's cover, in order to hide the wires. On one side place the brown and blue wire and on the other the black cable.

The sheath is preformable thanks to an integrated metal support. To facilitate installation, the sheath must first be slightly opened out, using, for example, an Allen wrench.

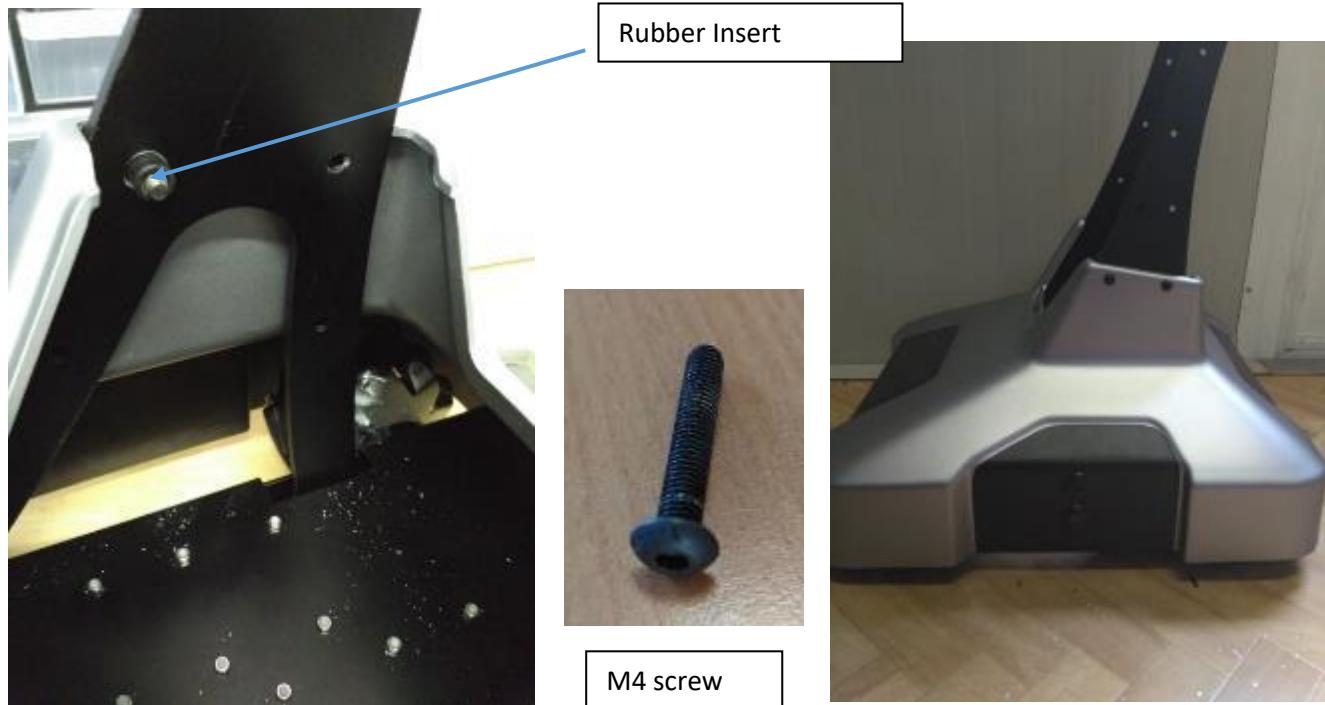


Lower part assembly

Cover assembly

The cover must now be mounted on the chassis. Start by placing an M4 rubber insert on each mast rod, in the front hole just above the rounding and M3 inserts on the chassis, in the 2 holes at the rear of it.

Then insert the cover from the top and slide it from the head downwards. Then screw the 2 screws into the inserts of the rods to secure the covers to the mat.



Installing the charging pads

The back, the cover has 2x 3 vertical holes: one big on the top and two small on the bottom, the top hole is made to receive the fault proof system of the pad, the second hole to insert the screw and the third one is useful only if there is a docking station, it allows to insert the connection cable. **(The pad can be a little different from the photo depending on whether it is a kit with or without a docking station but the assembly remains the same.)**

Position the two pads in place (Fault proof on top) and screw the M3 screws into the inserts previously installed in the chassis.

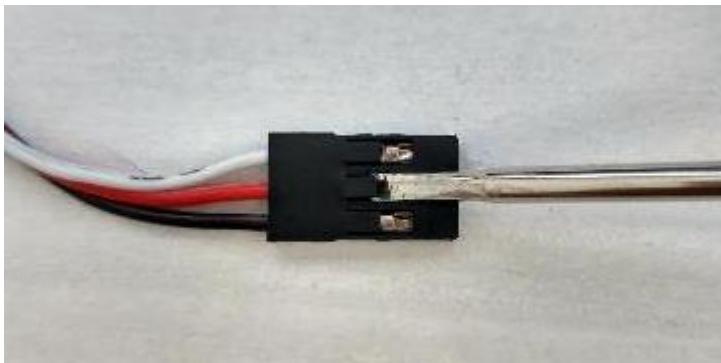


Installing the proximity (obstacle) sensors

Now that the cover is in place, it is necessary to wire the proximity sensors.

Pin A6 : Proximity sensor Front
Pin A7 : Proximity sensor Left
Pin A8 : Proximity sensor Back
Pin A9 : Proximity sensor Right

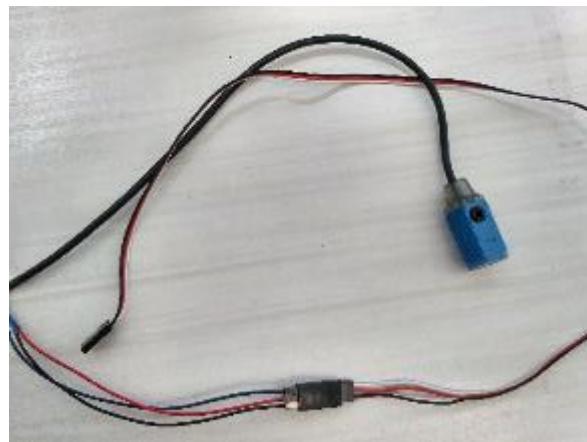
These infrared sensors need to be powered in 12V.



Remove the red wire from the small black connector: Simply lift the small plastic tab with a small flat screwdriver and then pull the wire

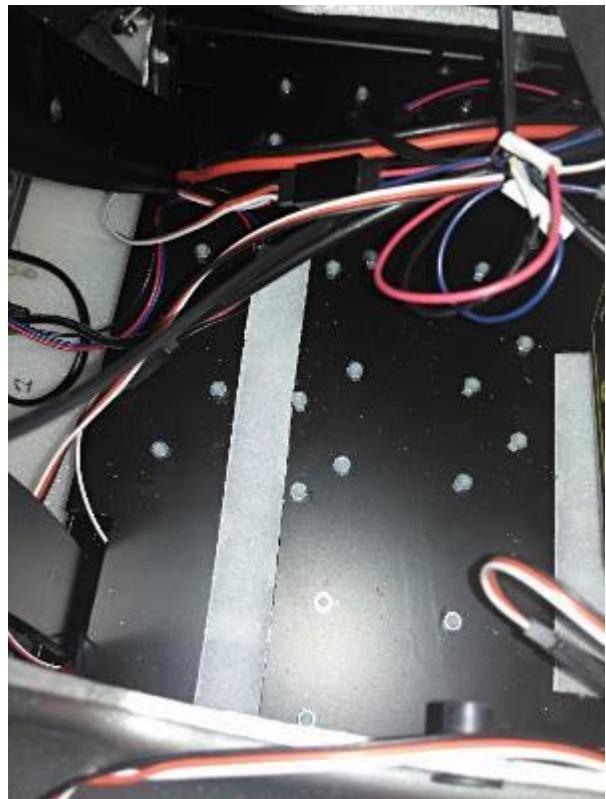
Then connect the 4 red wires of the sensors to a 5-way terminal block (gray / orange).

Add a red wire to the terminal block and connect it to the VS terminal on the [MP1] board to get the 12V.



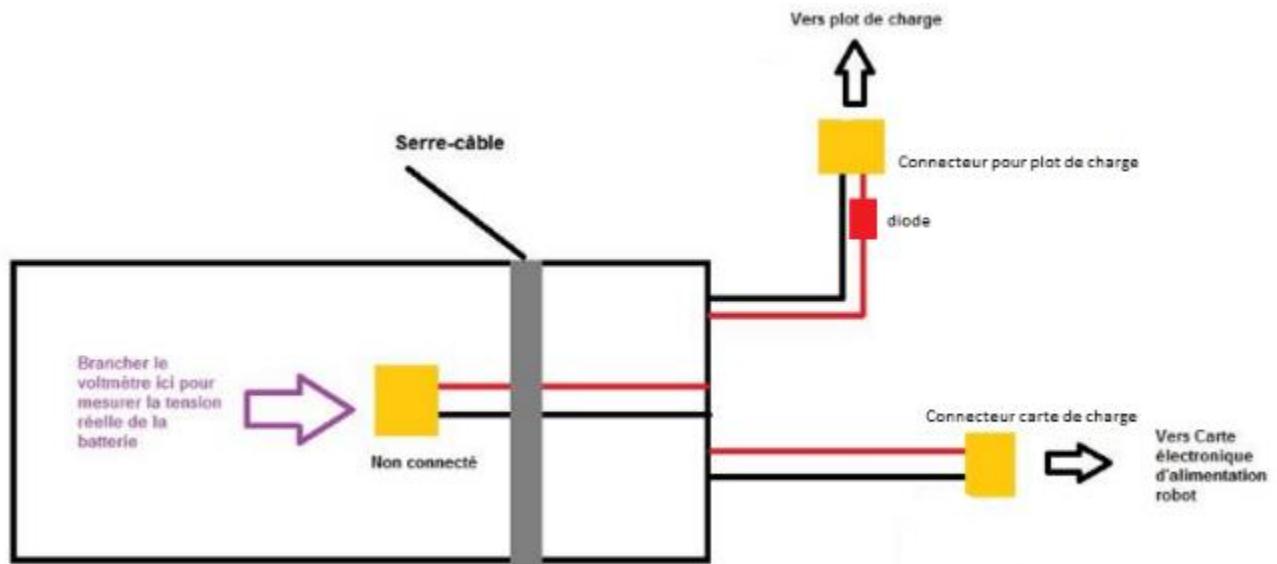
Battery and Charger Installation

It is now necessary to install the battery and the charger. They will be fixed with velcro scratch. It is therefore necessary to glue the supplied velcro on the chassis as well as on the battery and the charger.

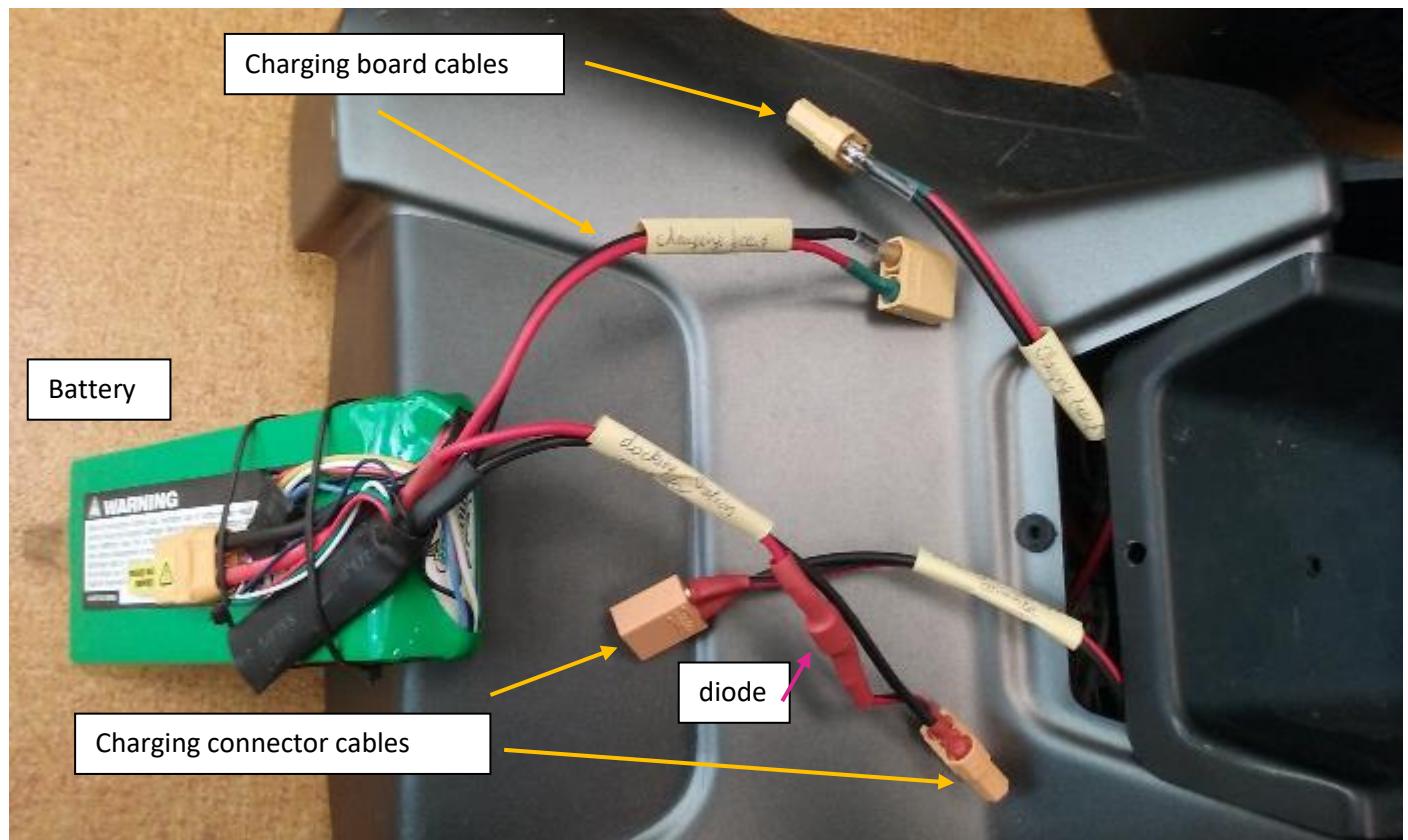


The battery must be connected with the following connectors.

Warning!!!! The battery is very powerful, it can deliver up to 10A. Above all, avoid short circuits, it can be dangerous.



Plug the charging board connector of battery cable to the charging board cable already connected to the robot and to the same with the charging connector cable of the battery to the charging connector cable of the robot already connected to the robot as well :



Installing the center cover of the chassis:

Put a rubber insert into each of the 2 holes at the top of the hull. All you have to do now is to position the cover and screw it in with M4 screws.



Clip the led of the [CDC] board into the led holder installed in the hole of the cover.

The mechanical and electronic assembly is now completed.



Setting-up a new robot.

Activation on the website.

Go to the following Web page: <https://maker.ubbo.io/>

The main page of the Web interface allows you to identify yourself if you are already registered or to create a new profile.

If the tablet has been provided along with the robot, an account has already been created, you can find this information in appendices.

Otherwise create a new account .



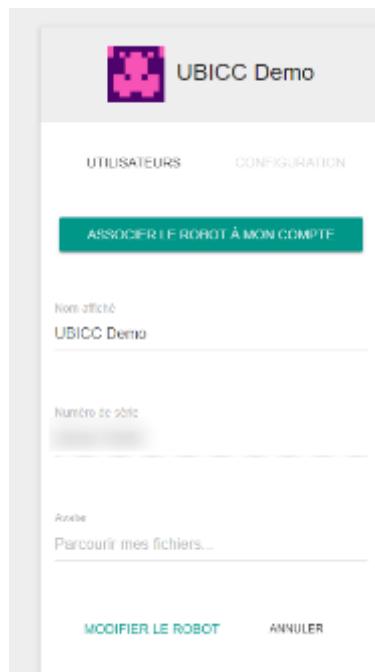
Once connected, the list of robots is displayed :



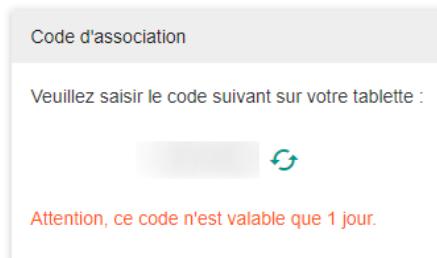

If no robot appears, the account does not yet have a linked robot: You must declare a new robot.

- Enter the name of the robot (your choice)
- And the serial number of the robot (supplied in the appendix)

A summary of the declared robot appears:



Click on « Link the robot to my account », the interface will generate a code to be copied onto the tablet application.



Tablet's application

Installing the APK

On an Android tablet or smartphone, install the Android Package (APK), provided on the CD supplied with the robot. Once the installation is completed, launch the application.

Pairing the tablet to the website

When no robot is linked to the application, the home page displays the following menus :



In order to link the account declared on the website to the tablet application, click on the "link the robot to my account" button and then enter the code previously generated on the website:

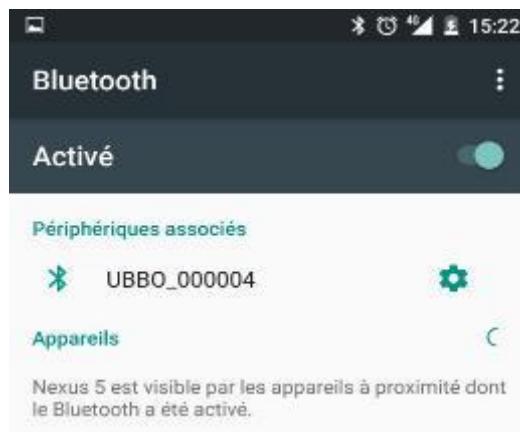


- A message validates the connection and the following main screen appears:



Pairing the tablet with robot's base:

To link the robot chassis to the tablet, the tablet Bluetooth must be linked to the chassis's Android system via the tablet's Android settings menu. The default code is 1234.



- Once pairing is completed, go to the « configuration » page of the tablet's application



A list of Bluetooth devices appears.

- Press the "Associer" button corresponding to the robot. (A validation message appears, and the button gets gray)
- It is then possible to test the connection by manipulating the robot in manual mode.

The pairing procedure is completed.

Starting tablet's application

Download the app on the tablet from the Android store: Make a search for “Ubbo” .

First page of the application is displayed as below:

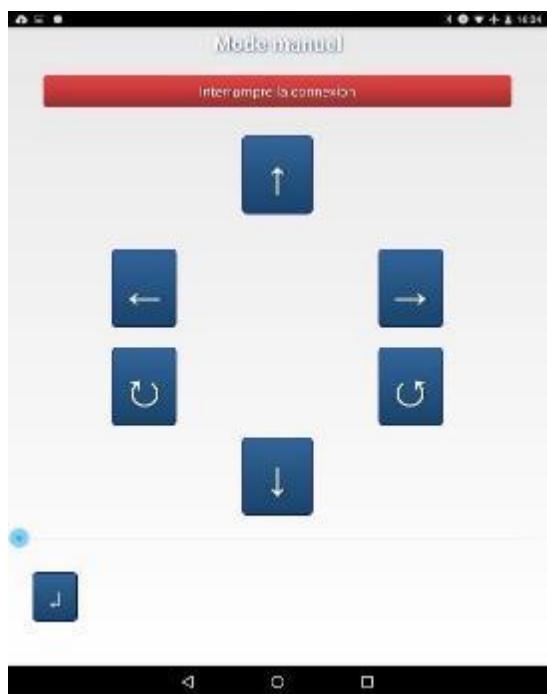


Configuration page



This page allows you to configure the connection between the robot chassis and the tablet application, as well as to access the manual Mode.

- Name of the Robot as set on the web interface.
- Application parameters.
- Pairing to robot's chassis (ref « configuration » chapter).
- Access to Manual mode.



The "Manual Mode" button allows you to control the robot directly in Bluetooth without using the internet.

It is possible to have a person nearby steering the robot and connect to the robot via the internet. However, only one person can have hand on the piloting part.

Connexion

The first button on the main menu (Connection) initiates the connection between the tablet and the web page. If the remote user is not yet connected to the web page, the app waits:



To connect remotely to the robot: access the web page <https://maker.ubbo.io/>

Enter the connection information (provided in the appendix):



Once connected, the list of robots is displayed:



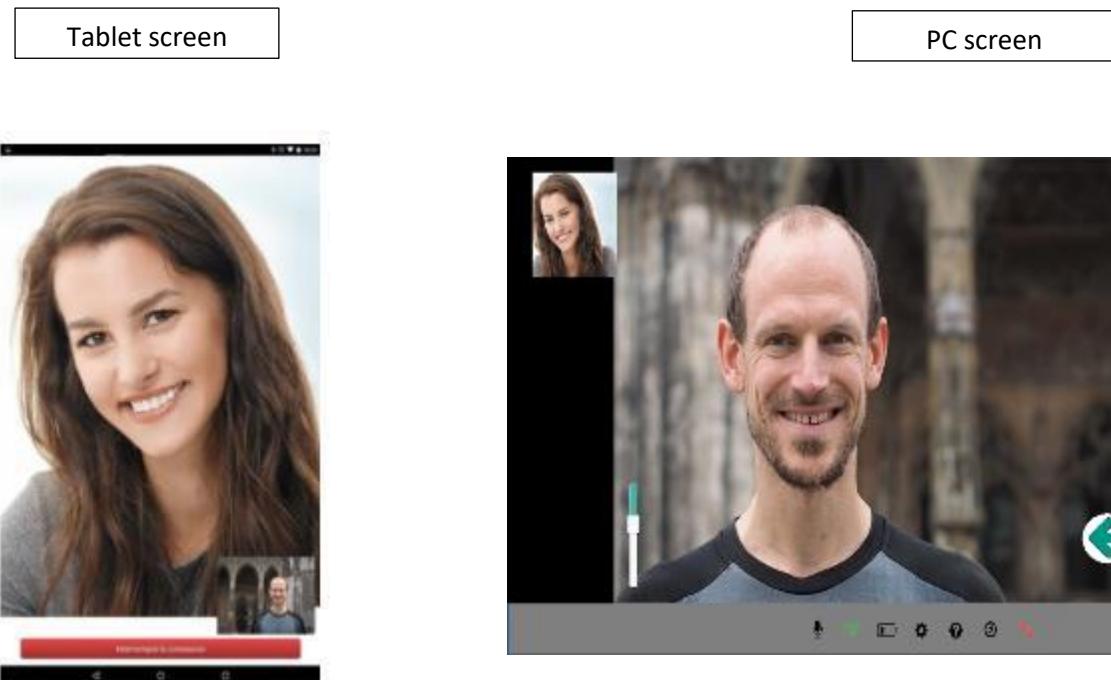
Click on the icon of the robot you wish to connect to.

Once the connection is established, if the image is blurry or arrives with delay, you certainly have a problem of internet speed. Turn off all on-going downloads (PC, smartphone, tablets).

We suggest to do a data speed test (www.speedtest.net for example): the minimums required are a ping response of less than 200ms, and a minimum 400Kb / s Upload and Download (corresponding to a 240p image).

We recommend a connection with a ping of less than 20ms and an output of 8Mb / s in upload and download for a full HD picture.

To exit this page, click on the "interrompre connection" button and return to the main menu with the "Retour" button on the tablet.



The Web interface screen is displaying four independent zones:

- The small window in the top left displays the image of the webcam of the user
- Below is the dash board displaying (from left to right):
 - o Microphone on/off button.
 - o Wifi Battery level.
 - o Background image size selection. Indeed, since the quality of the image adapts to the quality of the wifi signal, if the quality is bad, it is possible to reduce the size of the remote video in order to avoid the image being too pixelized.
 - o On-line help (key mapping)
 - o The geographical position of the robot (optional)
 - o Hang off
- The background displays the image received from the Android tablet camera.
- The virtual joystick can be controlled with the mouse or fingertip on the touch screen. It allows you to go forward / backward and rotate. The arrows allow to perform a right or left translation. Finally, the bar on the left controls the orientation of the tilt (tablet).

It is also possible to use keyboard keys (either on the touchpad with numbers 1-9, letters A, Z, E, Q, S, D, W, X, C) on a PC. or using a USB joystick / gamepad.



Réaccordage joueur

Z = Accélérer A = Déceler / Accélérer diagonale E = Accélérer diagonale D = Déceler diagonale W = Accélérer diagonale X = Déceler diagonale C = Accélérer diagonale S = Rallentir

Trouble shooting

Problem found	Check and corrections
<p>1. Power -on not possible The on/Off led remains off.</p>	<ul style="list-style-type: none"> - Check that the battery status LED is not lit in red. - Check the battery voltage with a voltmeter.
<p>2. The robot cannot move</p>	<ul style="list-style-type: none"> - Check that the battery status LED is not lit in red. (Insufficient battery charge). - Active proximity sensor(s) may be active, preventing movement in one or more directions.
<p>3. Bluetooth connection with Ubbo is not possible</p>	<ul style="list-style-type: none"> - Check the pairing of the Android tablet with the Bluetooth card (General Settings). - Check the association of the robot in the configuration page of the application.
<p>4. Battery red Led is on</p>	<p><u>The battery voltage level is too low.</u> Connect the supplied charger to recharge the battery.</p>
<p>5. The battery does not recharge</p>	<p>See Appendix:</p> <ul style="list-style-type: none"> - Check the battery voltage. - Follow the battery charging procedure

Cleaning, maintenance and periodicity

Before any cleaning, switch Ubbo off using the on/off switch.

Cleaning, maintenance and periodicity

Overall cleaning :

The entire robot must be kept clean at all time.

Weekly :

The 'proximity' sensors must be checked and / or cleaned with a slightly damp cloth.

Dock station option :

- Infrared sensors must be checked and / or cleaned with a slightly damp cloth.
- Check the cleanliness of the ultrasonic sensor on the back of Ubbo.

Monthly :

Check the MECANUM wheels for cleanliness. Remove all residue around the axles and rolling elements.

Every 6 months:

Check the battery condition: no leakage, no distortion.