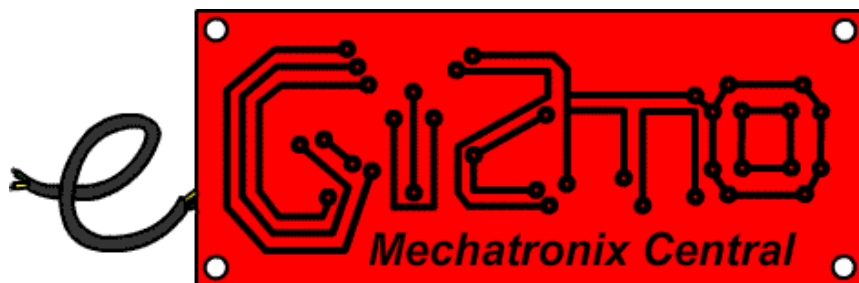
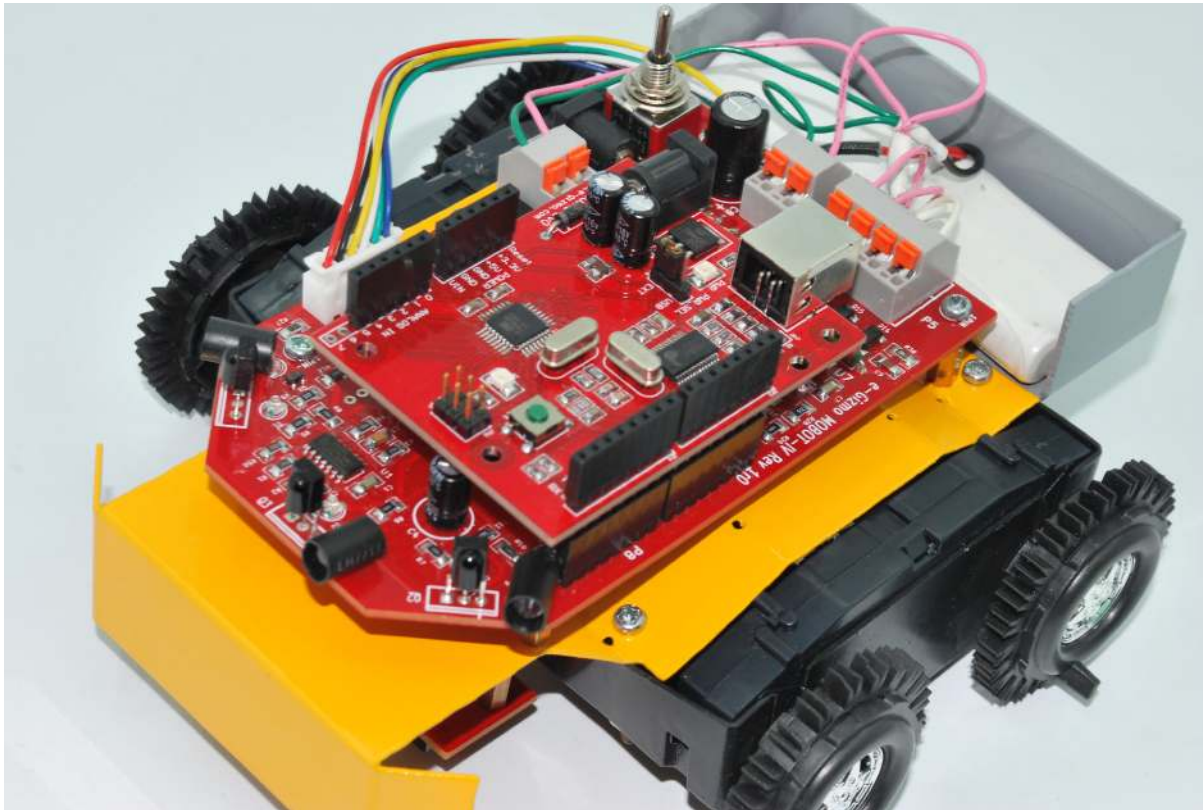


e-Gizmo











# MOBILE ROBOT

## Assembly Manual

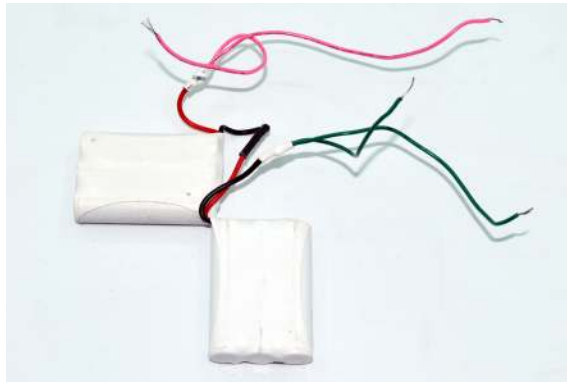


# Mobile Robot

## Parts List

 <p><b>3x10 cm Cross Screws (8 pieces)</b></p>	 <p><b>3x20 cm Cross Screws (4 pieces)</b></p>
 <p><b>3x36 cm Cross Screws (4 pieces)</b></p>	 <p><b>3 mm Hexagonal Nuts (4 pieces)</b></p>
 <p><b>1.2 cm Hexagonal Brass Studs (4 pieces)</b></p>	 <p><b>2.2 cm Hexagonal Brass Studs (2 pieces)</b></p>
 <p><b>Metal Chassis</b></p>	 <p><b>Metal Battery Holder</b></p>
 <p><b>(One-side) Wheeled Motor System</b></p>	 <p><b>(Other-side) Wheeled Motor System</b></p>

# Mobile Robot



**Two 3-AA Battery Packs**



**IR Sensor Array Board**



**Gizduino v2.0 Board**



**Main Circuit Board**

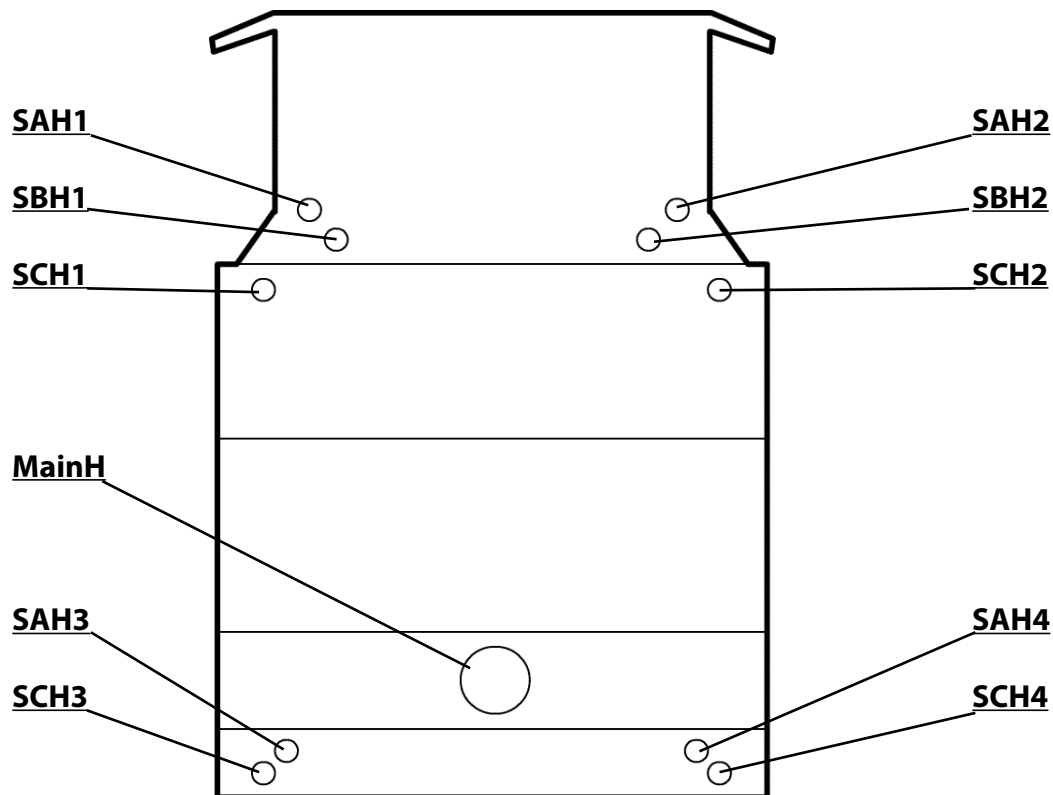
# Mobile Robot

## Assembly - Chassis

<b>Tools Needed:</b>	0.3 cm diameter cross screw driver, flat-nose pliers
<b>Parts To Be Used:</b>	4 pieces of 3x10 cm Cross Screws - ( <b>SCREW A</b> ) 4 pieces of 3x20 cm Cross Screws - ( <b>SCREW B</b> ) 4 pieces of 3x36 cm Cross Screws - ( <b>SCREW C</b> ) 4 pieces of 3 mm Hexagonal Nuts - ( <b>NUT</b> ) 4 pieces of 1.2 cm Hexagonal Brass Studs - ( <b>STUD A</b> ) 2 pieces of 2.2 cm Hexagonal Brass Studs - ( <b>STUD B</b> ) 1 Metal Chassis 1 Metal Battery Holder 2 Wheeled Motor Systems 1 IR Sensor Array Board

Like the usual assembly of any automobile, we will start the assembly of the e-Gizmo Mobile Robot (Mobot) with its chassis.

First, prepare the Metal Chassis, Metal Battery Holder, (4) SCREW A, and (4) STUD A. In order to simplify instructions, we will be using the labels shown in the following diagrams that correspond to the holes found on the Metal Chassis and Metal Battery Holder.



**Figure 1 - Metal Chasis Hole Labels (Overhead View)**

# Mobile Robot



**Figure 2 - Metal Battery Holder Hole Labels (Overhead View)**

We now move on to building the chassis. Place the Metal Battery Holder under the rear of the Metal Chassis such that their holes are in the same place. Notice that the labels of the holes of the battery holder are the same as those for the rear holes of the chassis; this is to guide you as to which holes go with each other. That is, SAH3 of the battery holder must be directly under SAH3 of the chassis, SAH4 of battery holder must be under SAH4 of chassis, and so on.

Once you have positioned the parts according to the above, take four (4) SCREW A and insert them into the holes SAH1, SAH2, SAH3, and SAH4 upside-down. This step is displayed in the following pictures below.



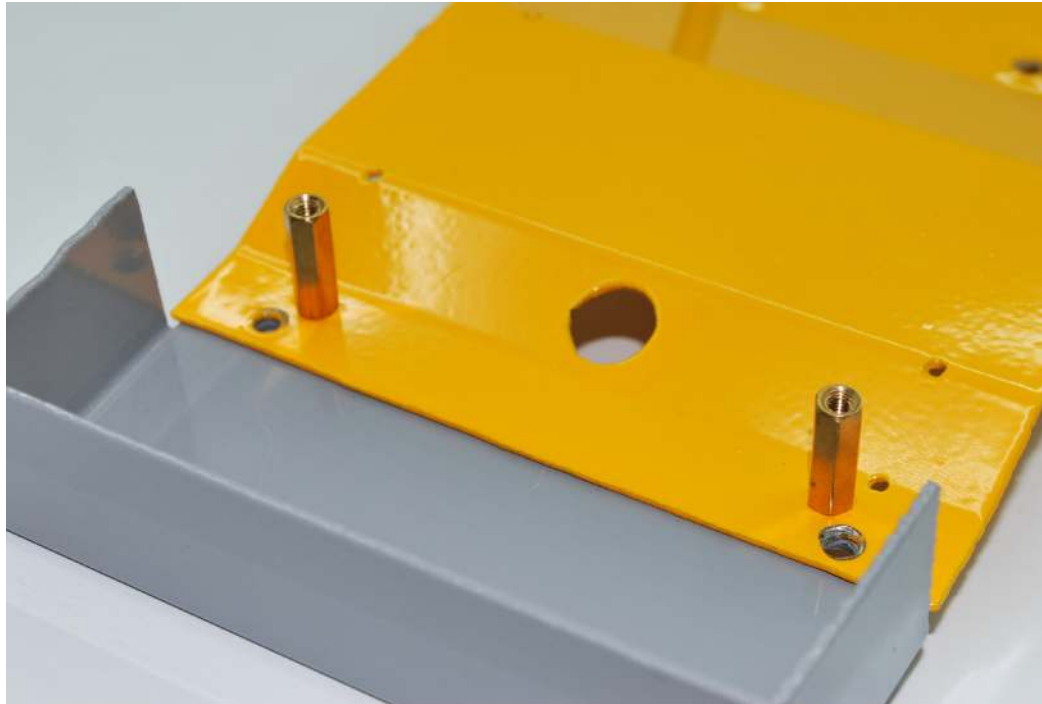
# Mobile Robot



Now take four (4) STUD A and attach them to all of the exposed screw ends. The brass studs will secure the screws and metal parts in place and will later on serve as supporting legs of the e-Gizmo Robot Main Circuit Board (to tighten the attachments, hold the brass studs using a flat-nose pliers while twisting the screws using a cross screwdriver).



# Mobile Robot



After you have secured the brass studs in place, we shall now move on to assembling the two Wheeled Motor Systems under the Metal Chassis. This part requires a fair amount of dexterity from the assembler, so that if you are not used to handling mechanical assemblies, we ask of your extreme patience in the succeeding part!

For this step, take any of the two Wheeled Motor Systems (here we use one which have white-colored wires) and position the two holes of the Wheeled Motor System directly where the SCH1 and the SCH3 are while the wheels are positioned on the out-side of the Metal Chassis (obviously). Place the wires leading out of the motor systems into the MainH so as to make sure we do not lock the motor in with the wires inside.



# Mobile Robot

Hold the motor system position by inserting a SCREW C into the holes of the Metal Chassis, which are SCH1 and SCH3, and then through the holes of the Wheeled Motor System. If the long screws do not seem to go through smoothly, try to gently screw them while pushing further. Your assembly should have the SCREW C heads visible on the top of the Metal Chassis.

To lock the parts in place, screw a NUT to each of the ends of the SCREW Cs. This part will demand a small level of dexterity from you because in order to properly and securely lock down a NUT you must use a flat-nose pliers to hold the small NUT steady while twisting the long screw from the other side using a cross screwdriver.

You may find the grip of your pliers on a NUT slipping from time to time. This is to be expected as the surfaces of the objects are rather smooth and therefore have little friction on each other, which results in reduced grip. Take your time and rotate your screwdriver on a SCREW C slowly while maintaining an easy grip on your pliers - gripping the pliers too tightly or driving the long screw in a hurry will only cause slips to occur more often, which will be very frustrating for you indeed.

There is another obstacle you might run into, and that is when the NUT reaches the socket-like end of the motor system hole. You might observe that as you grow closer to fully tightening the NUT, the NUT also grows deeper into the socket, thus reducing the area of grip your pliers have on the NUT. To slightly solve this obstacle, tilt your pliers to an angle such the flat tip of your pliers is parallel to the (diagonal) wall bearing the NUT. If this is confusing, refer to the picture below.



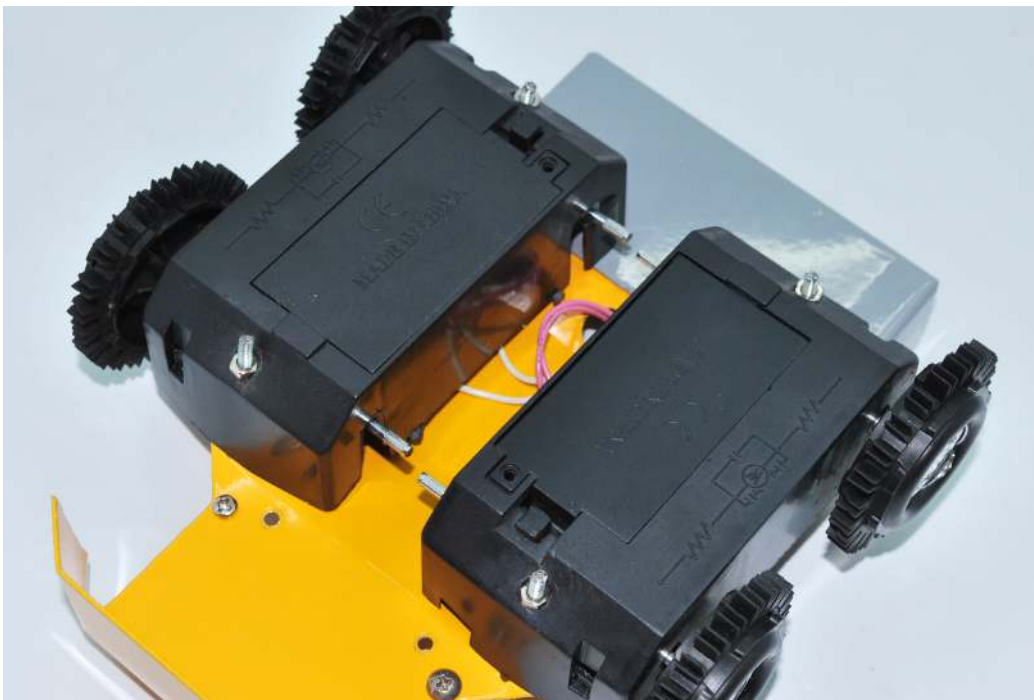
Do this for the two long screws and you should have your assembly in resemblance with the next picture.



# Mobile Robot



Once you are done, do all of the corresponding steps once again for the Wheeled Motor System at the other side. Note that the motor system holes should coincide with the SCH2 and the SCH4. All this will result in the below picture.

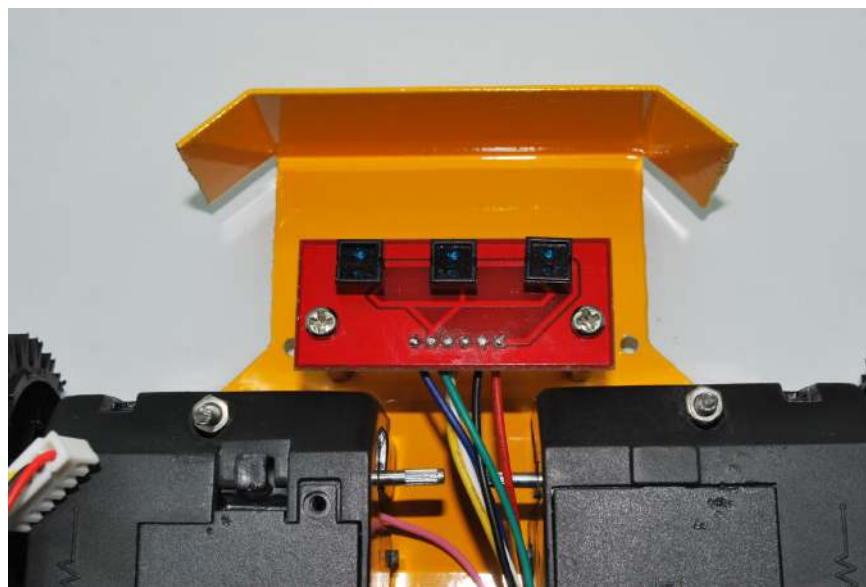


# Mobile Robot

We are finally done with the most tedious part of the assembly! Now, we attach the IR Sensor Array Board also to the underside of the Metal Chassis. Prepare the IR Sensor Array Board, four (4) SCREW B, and two (2) STUD B. Insert a SCREW B into the holes SBH1 and SBH2 of the Metal Chassis where the heads of the screws are on the top side of the chassis. Attach a STUD B to each of the screws (once again, use your pliers to hold the studs in place) and lock them in place by tightening.



If your assembly resembles the picture above, you may proceed to attaching the IR Sensor Array Board unto the two studs using the remaining SCREW Bs. Make sure that the side where the IR sensor are placed is facing away from the chassis.



# Mobile Robot

After the complete attachment of the IR sensor, we can now transition into the assembly of the final parts of the e-Gizmo Robot! However, before we move on to that we have to first ensure that all connecting wires are placed through MainH as these wires are meant to be connected to the Main Circuit Board. You will find that in placing the wires through MainH, the wafer connector part of the IR sensor wiring seems not to fit through MainH. It can, actually. By first removing all other wires from MainH and inserting the wafer from its side can you get it through MainH. The fitting, however, will not be smooth. A light amount of force must be delivered in order to successfully pass it through MainH without damage. You must take great care in forcing it through as you might damage the wires connected to the wafer head. When you have successfully got the wafer connector through MainH, have all other wires go through MainH as well.



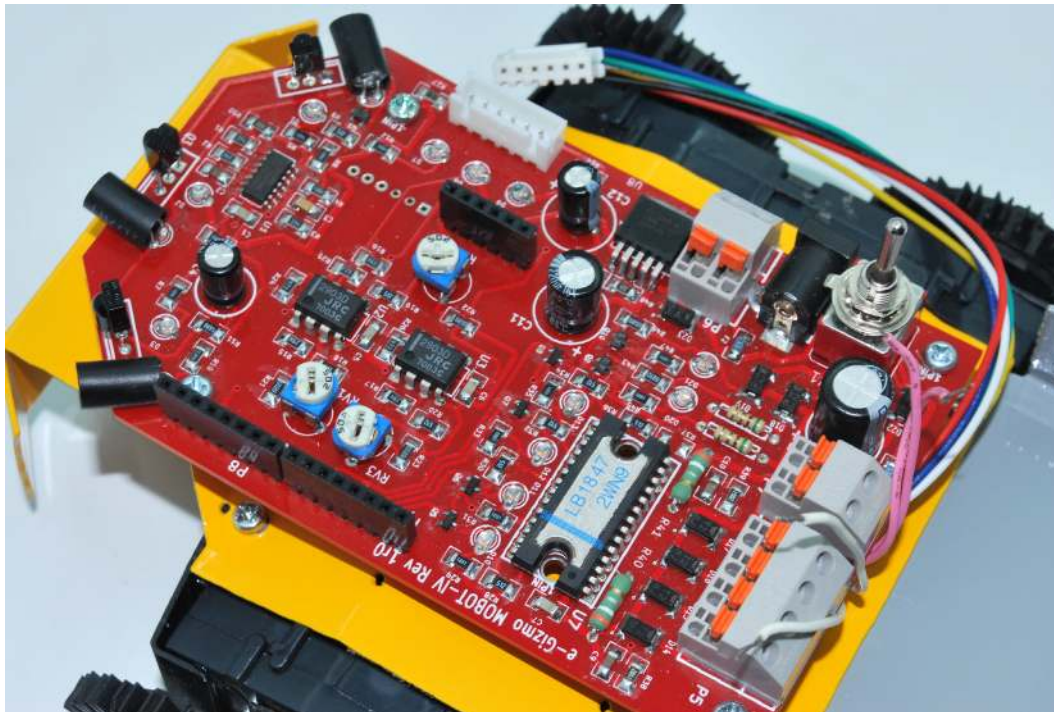
# Mobile Robot

## **Assembly - Circuit Boards**

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The second and final part of the assembly of the e-Gizmo Mobot centers only simply on the attachments of the circuit boards, batteries, and connective wirings.

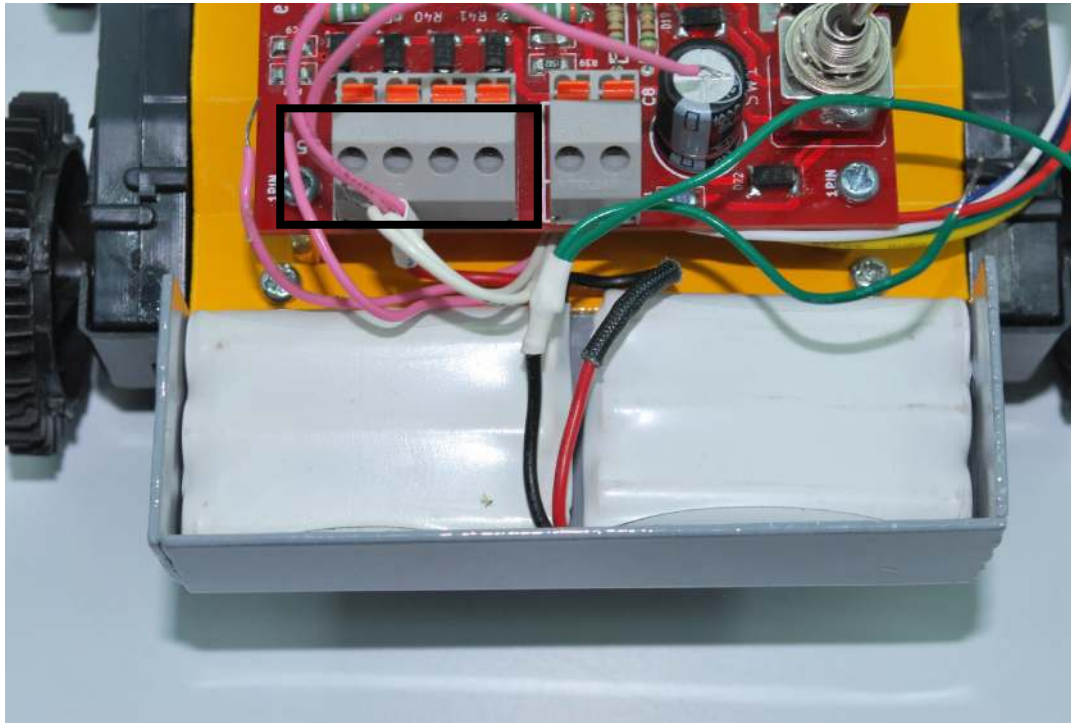
We attach first the Main Circuit Board by taking four (4) of SCREW A and screwing the four holes of the Main Circuit Board to the four short brass studs on the Metal Chassis. The side of the Main Circuit Board where there are diagonal cuts on each side should be the side facing towards the bumper side of the Metal Chassis. Because you are handling a circuit board, it is of great importance that care must be taken in screwing the board to the brass studs. 'Slipping' your screwdriver sideways due to uncontrolled force could damage adjacent electronic parts!



Once the Main Circuit Board is properly intact, you may wish to arrange the wires as in the picture above to avoid unnecessary entanglements and confusions.

Next is to place the two battery packs into the battery holder. The side of the batteries where its wirings come out from must each face each other when placed in the battery holder.

# Mobile Robot



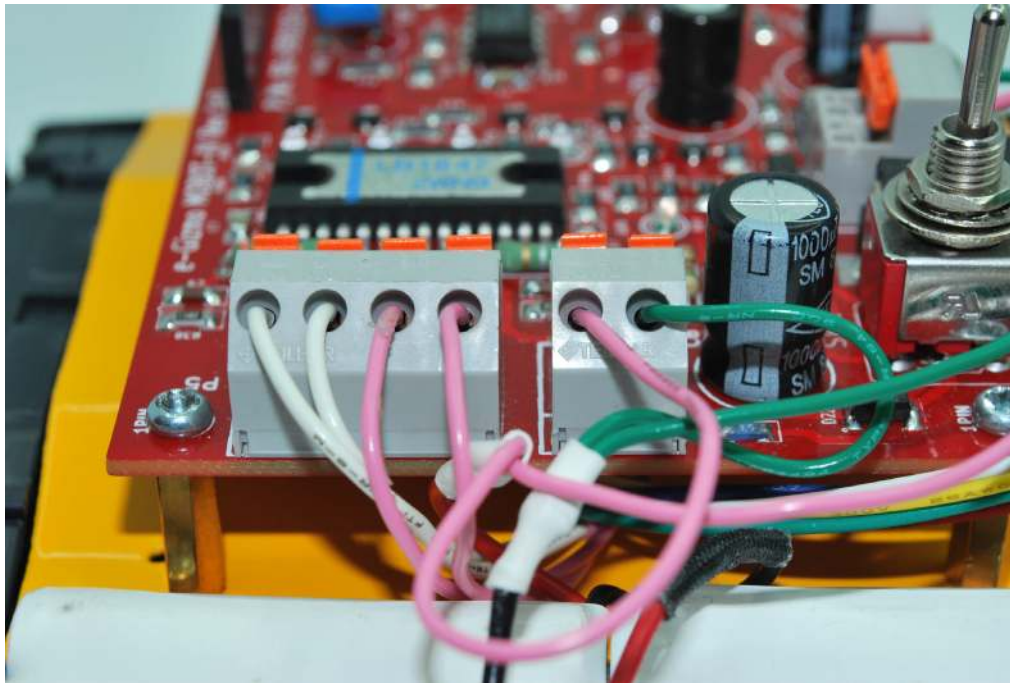
The assembly at this point turns to the proper connections of the wires to the terminal blocks of the Main Circuit Board. Notice the four-socket terminal block in the above picture. The two sockets to the left correspond to the two wires that lead to the left Wheeled Motor System, while the two sockets to the right correspond to the two wires that lead to the right Wheeled Motor System. For example, if you placed a motor system with pink-colored wires on the left side of the chassis, then the two wires must be placed in the two sockets to the left of the four-socket terminal block, and the wires of the right side motor system to the two right sockets as below.



# Mobile Robot

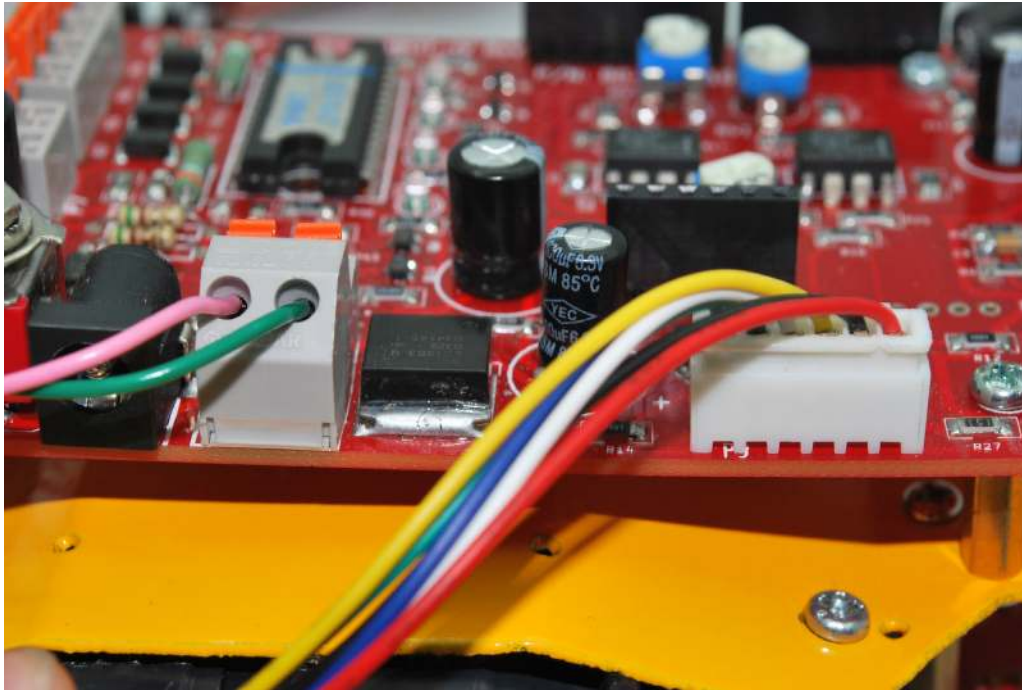
The terminal block with two sockets just to the right of the four-socket terminal block handles the wire connections between the robot and its batteries. If you were to examine the wirings of the battery packs, you will see that there are two thick wirings coming from the batteries themselves, one colored red and the other black, and from each of these thick wirings two more wirings branch out (for this manual, the colored wires branching from the thicker red wire are coloured pink and the wires branching from the thicker black wire are colored black). The thick red wire indicates that its two branching pink wires lead to the positive terminal of the batteries and the thick black wire indicates that its branching green wires are connected to the negative or ground terminal of the batteries.

The positive terminal socket of the two-socket terminal block is the one on the left and the negative or ground terminal is the one on the right. Thus you need to connect one of the two pink wires to the left socket and one of the two green wires to the right socket. Connect the shorter of the two wires for both cases as the longer ones are meant to be connected to a terminal block farther to the side of the Main Circuit Board.

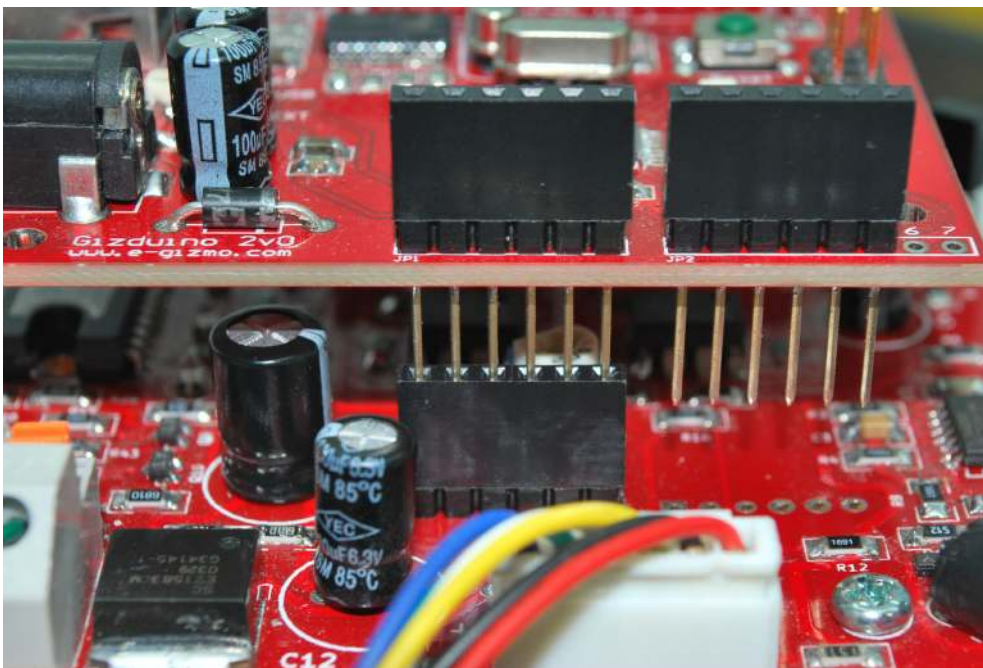


Turn your attention now to the right side of the e-Gizmo Mobot where you should find another two-socket terminal block and a wafer socket. Connect the remaining green and pink wires on the same sides as the one before (where pink goes to left socket and green goes to right socket) and attach the wafer connector of the IR Sensor Array Board to the wafer socket.

# Mobile Robot

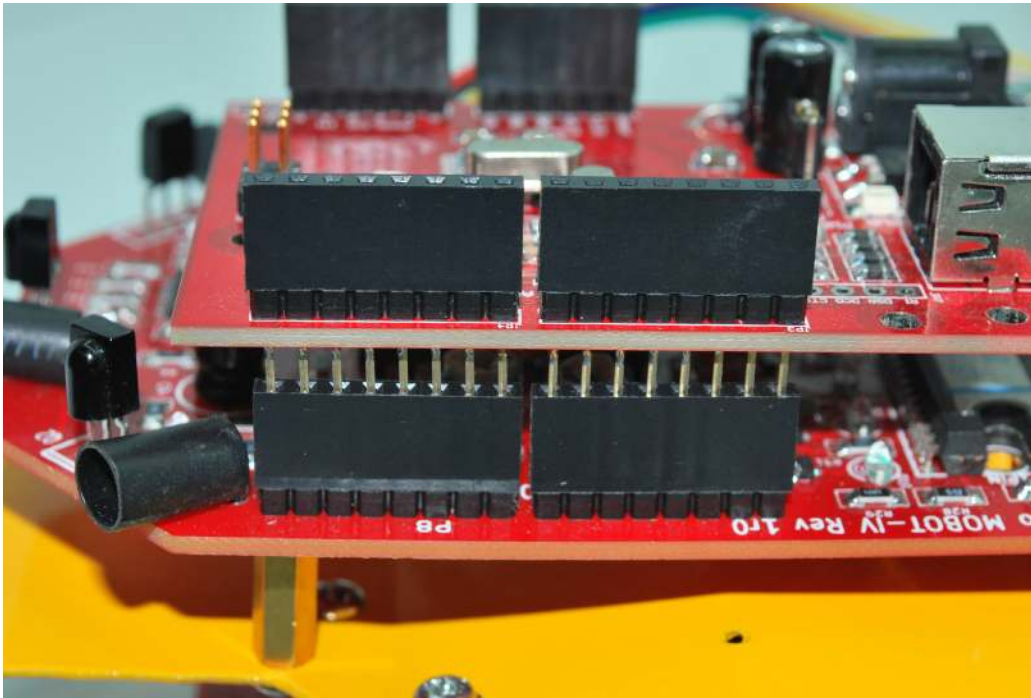


For the last part attachment, take the e-Gizmo Gizduino Board and place it into the header sockets of the Main Circuit Board as shown in the pictures below. The side of the Gizduino where the USB serial port socket is located must face the back or the battery holder side of the robot.



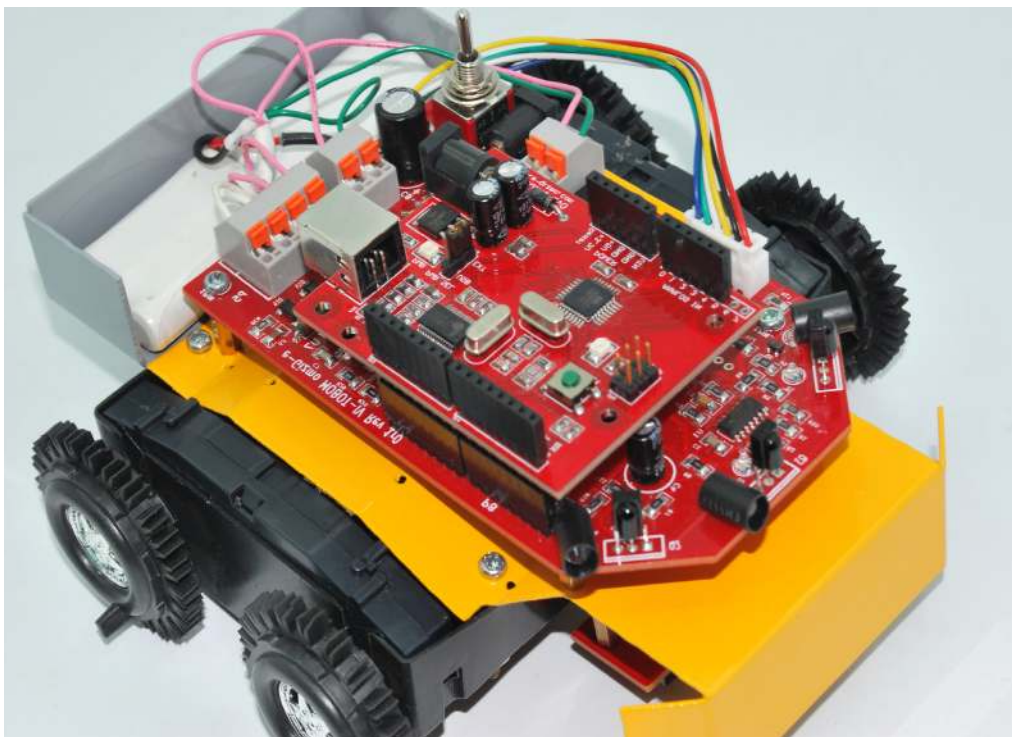
(Viewed from the right side)

# Mobile Robot



(Viewed from the left side)

The assembly has finally finished! If you did everything according to the instructions from the start and assuming this manual has no errors whatsoever, your e-Gizmo Mobile Robot should look like the one in the cover page, which we will display here again with a different orientation.

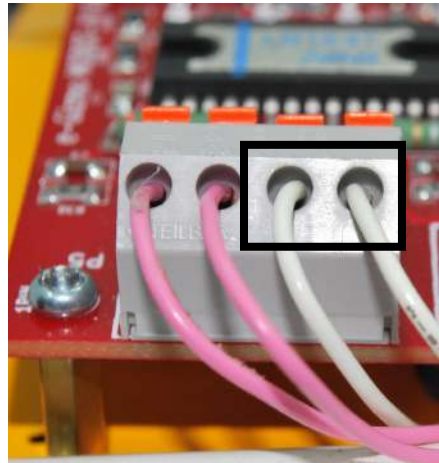




# Mobile Robot

## Assembly - Calibrations and Settings

Now that your e-Gizmo Mobot is completed in assembly, you can try testing it by flipping the lever switch found on the lower-right corner of the Main Circuit Board to the left. Assuming your batteries are at full power, the mobot should run its wheels after a few seconds of start-up time. It may happen that the wheels are not turning in the way that would make the mobot move forward. This is because the wires of the abnormal Wheeled Motor System are reversed in its connection to the four-socket terminal block. For example, the Wheeled Motor System with the pink-colored wires could be turning in reverse. To remedy this you only need to exchange the connections of the two pink wires with each other on the four-socket terminal block (the wires to be exchanged are boxed in the image below).



About the different settings of the lever switch, when the switch is shifted to the left, it powers on the mobot. When the lever is positioned in the middle, it turns off the power of the mobot. The lever set to the right opens the mobot for charging. This lever setting is used primarily for recharging the batteries in the case that they become empty of power. To charge the mobot you can use and connect 9-volt output voltage regulating adaptor to the voltage socket found just above the lever switch.



- 9V Power Adaptor
- 9V Adaptor Port
- Lever Switch (Charging State)