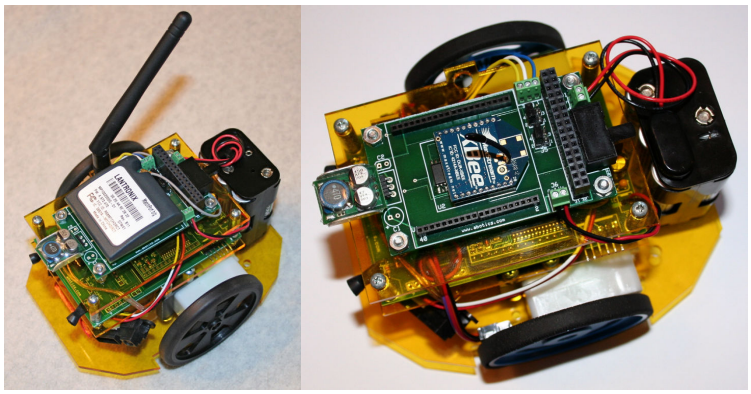
OPEN-ROBOT Assembly Manual

By Abe Howell's Robotics

Introduction:

This manual will guide you through the required assembly steps for your OPEN-ROBOT kit. First you will solder and assemble the controller board. The controller board will be the "Brains" of your robot. Approximate assembly time is 4 hours, but heavily depends upon your soldering experience.



OPEN-ROBOT shown with Matchport b/g (left) and XBee (right)

About the OPEN-ROBOT Controller Board:

The OPEN-ROBOT Controller Board is a unique Low-Cost Robot Controller designed specifically for use with (2) WW-02 wheel encoders from Nubotics™ and is the first robot controller board to integrate a low-cost radio frequency identification (RFID) module from SonMicro *(purchase separately)*. Either (1)-MatchPort b/g WiFi module or (2)-XBee ZigBee modules and (1)-XBee Explorer USB must be purchased separately to provide OPEN-ROBOT with wireless capability.

Preface:

This assembly manual assumes that you have soldering experience and can identify common electronic components, i.e. resistor, capacitor, LED, IC-Socket, header, voltage regulator and common mechanical parts i.e. machine screw, nut, washer. If you are uncomfortable with the above statement then please feel free to return your ***unopened*** OPEN-ROBOT Kit. However, if you are up for the challenge then we hope you enjoy the assembly process. All images are high resolution, so zoom in when you need a closer view of what is going on.

Review OPEN-ROBOT Controller Board Component List:

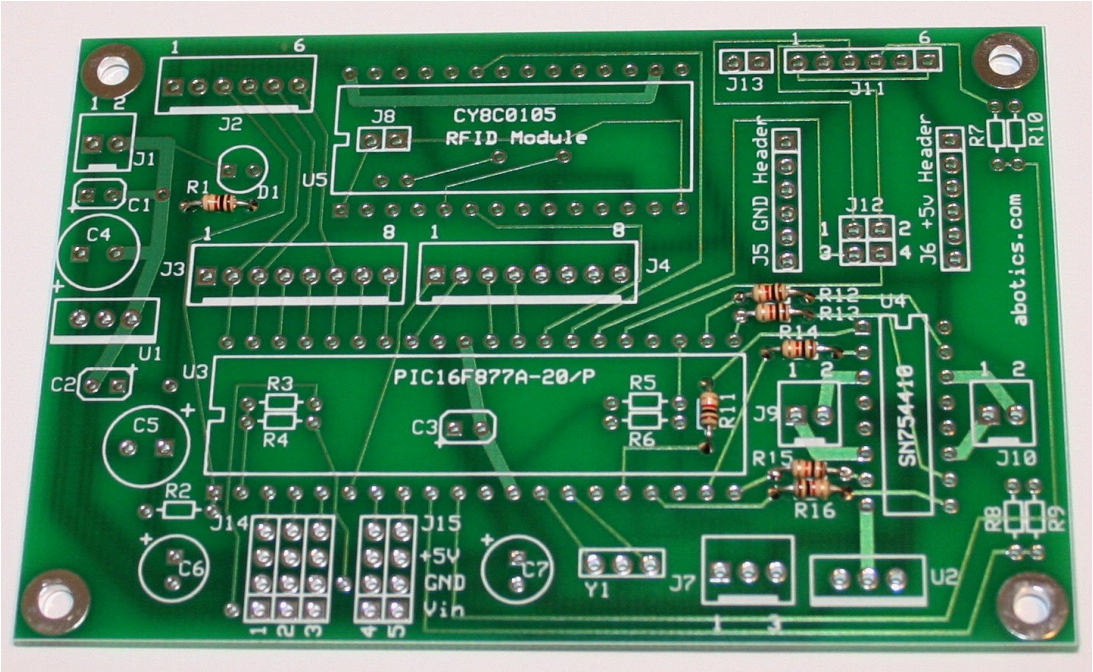
QTY Description

(7) 1k Ohm Resistor - R1, R11, R12, R13, R14, R15, and R16
(1) 47k Ohm Resistor – R2
(5) 4.7k Ohm Resistor – R3, R5, R6, R7 and R8
(1) 2.7k Ohm Resistor – R4
(2) Cadmium Sulfide Photocell – R9 and R10
(3) 0.1µF Tantalum Capacitor – C1, C2, and C3
(2) 33µF Capacitor – C6 and C7
(2) 100µF Capacitor – C4 and C5
(1) 40-Pin IC Socket – U3
(1) 16-Pin IC Socket – U4
(1) 28-Pin IC Socket – U5
(5) 4-Position Non Polarized Header – J14 and J15
(1) 2-Position Non Polarized Header – J8
(2) 2-Position 0.1" pitch Terminal Block – J9 and J10
(1) 6-Position 0.1" right angle non-polarized header – J2
(1) 20Mhz Resonator – Y1
(1) Green LED – D1
(2) +5 Volt 1.5 Amp Voltage Regulator – U1 and U2
(1) PIC18F4520 Microcontroller – U3
(1) SN754410 H-Bridge – U4
(1) 1" Length 3/16" Diameter Heat Shrink Tube

Required & Optional Tools:

- Soldering Iron & Solder (***Required***)
- Wire Snips or Side Cutters and Needle Nose Pliers (***Required***)
- Wire Stripper (***Required***)
- Phillips and flat head screwdriver (***Required***)
- Metal hand file, nail file, or sand paper (***Required when using MatchPort b/g***)
- Multi-Meter (Test assembled board & measure resistors) (***Optional***)

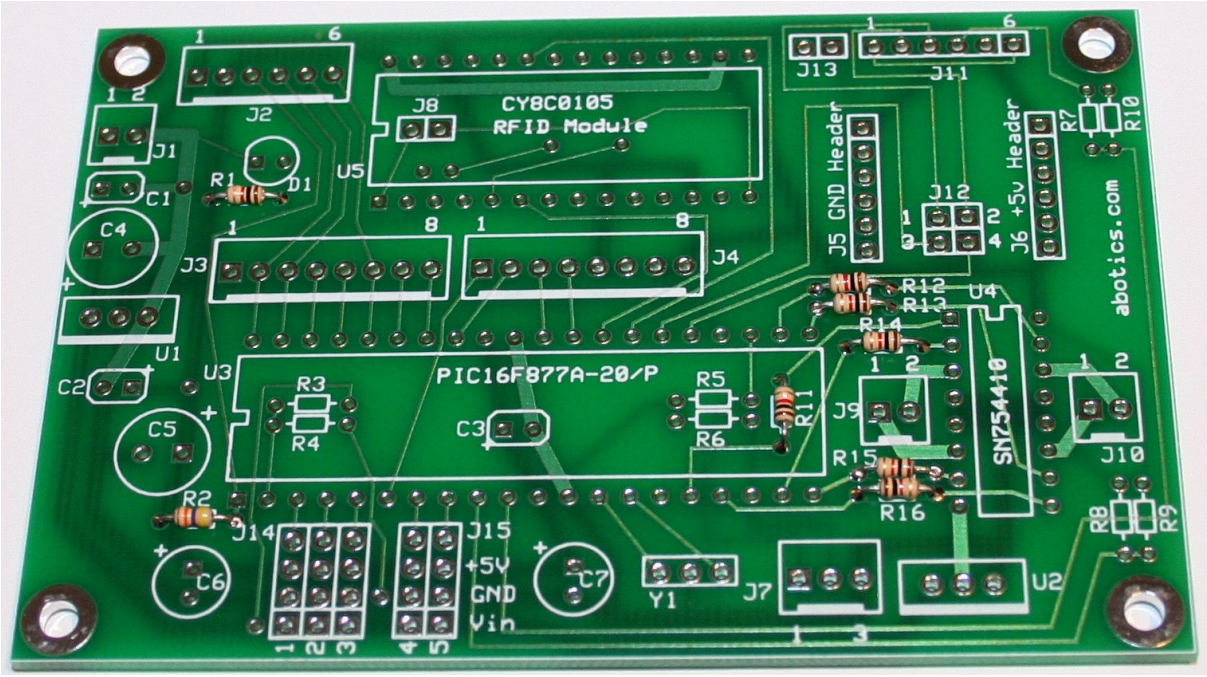
Step#1, Solder 1k Ohm Resistors:



Figure#1, Solder 1k Ohm Resistors.

In step#1 solder (7) 1k Ohm resistors as shown in figure#1. The **brown-black-red** color band identifies a 1k Ohm resistor. Solder the (7) resistors in the following locations on the board: R1, R11, R12, R13, R14, R15, and R16. After soldering the resistors be sure to snip off the excess wire as close to the board as possible without damaging the board or solder joint (save a piece of wire for later use as a jumper). R1 is used as a current limiting resistor for the board's green led. R11, R12, R13, R14, R15, and R16 are used as current limiting resistors for the SN754410 h-bridge chip to prevent damage to the PIC18F4520.

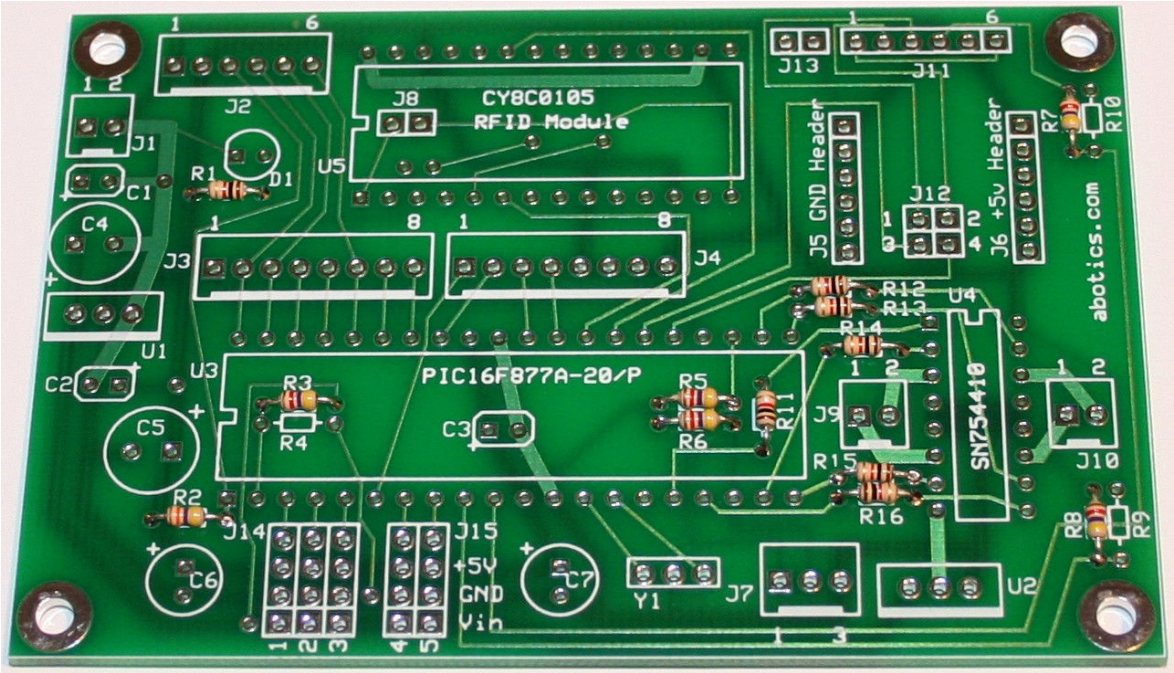
Step#2, Solder 47k Ohm Resistor:



Figure#2, Solder 47k Ohm Resistor.

In step#2 solder (1) 47k Ohm resistor in location R2 on the board. The **yellow-violet-orange** color band identifies a 47k Ohm resistor. R2 is used to pull the PIC18F4520's MCLR pin high, but also allows for in-circuit programming (ICP).

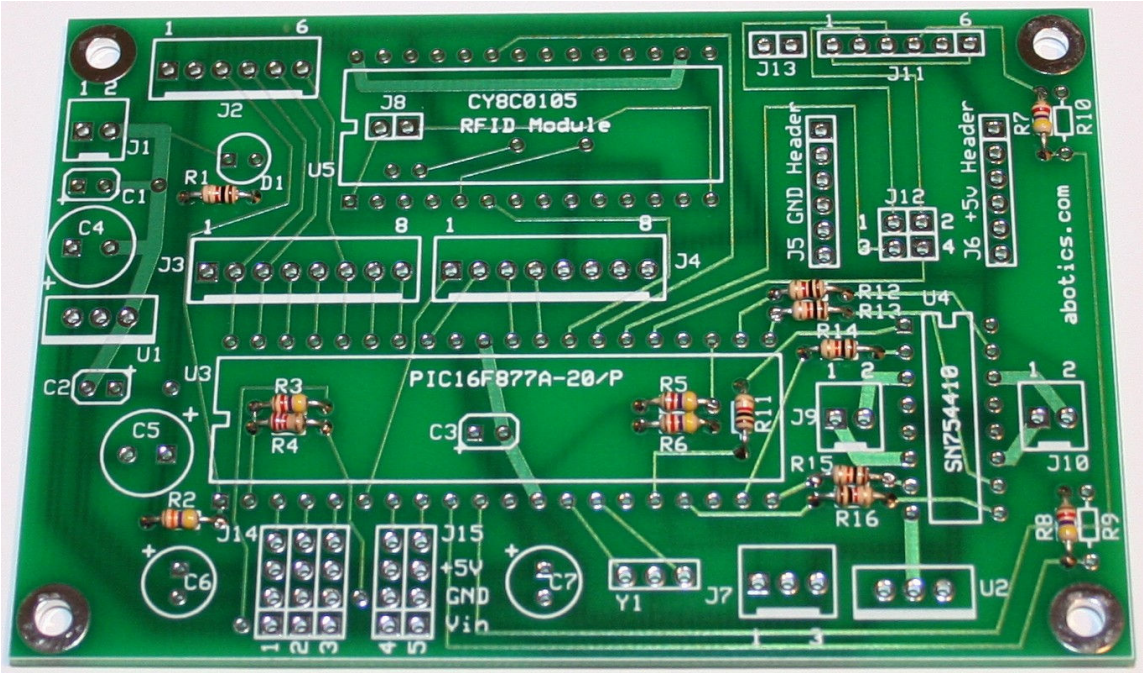
Step#3, Solder 4.7k Ohm Resistors:



Figure#3, Solder 4.7k Ohm Resistors.

In step#3 solder (5) 4.7k Ohm resistors in the following locations: R3, R5, R6, R7, and R8. The **yellow-violet-red** color band identifies a 4.7k Ohm resistor. R3 is used as part of a battery voltage monitoring circuit. R5 and R6 are used as pull-up resistors for the PIC18F4520's I^2C pins. R7 and R8 are used in a voltage divider so that the output from the light sensing cadmium sulfide photocells can be measured.

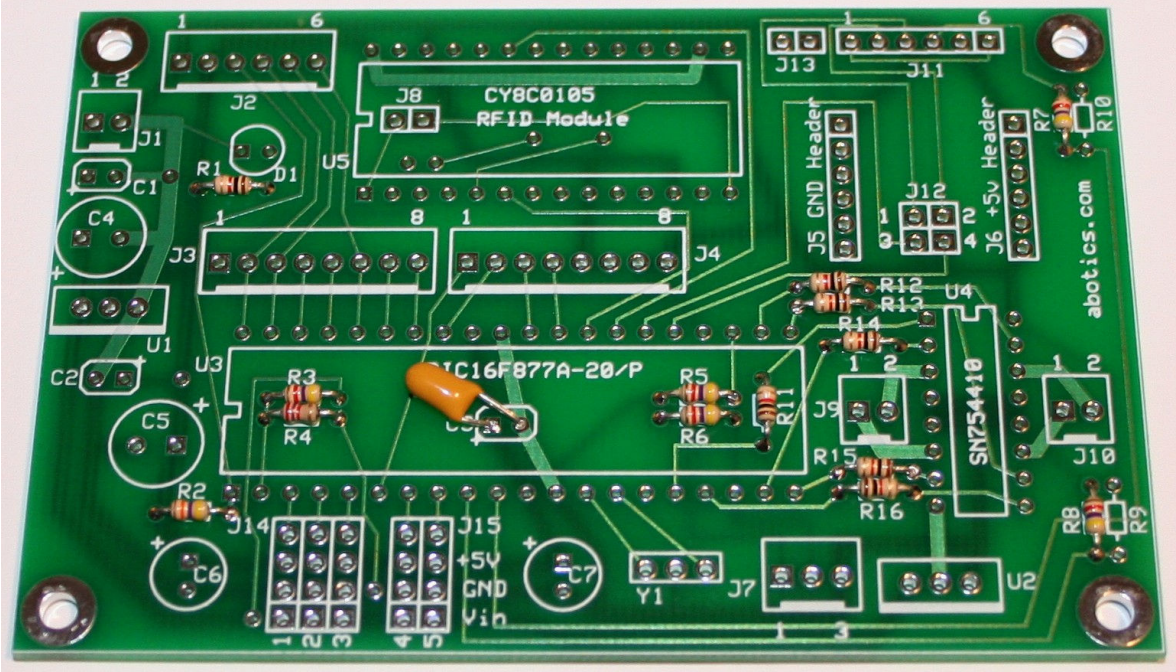
Step#4, Solder 2.7k Ohm Resistor:



Figure#4, Solder 2.7k Ohm Resistor.

In step#4 solder (1) 2.7k Ohm resistor in the location R4. The **red-violet-red** color band identifies a 2.7k Ohm resistor. R4 is used in conjunction with R3 as part of a battery voltage monitoring circuit.

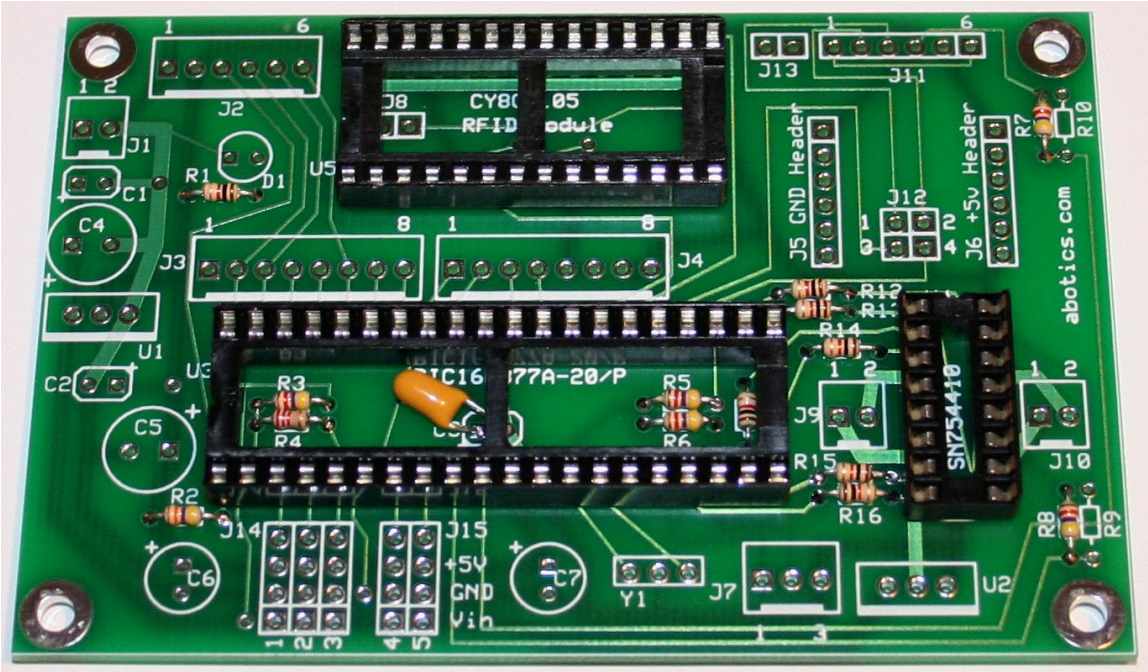
Step#5, Solder 0.1μF Tantalum Capacitor:



Figure#5, Solder 0.1 μF Capacitor.

In step#5 solder (1) 0.1μF tantalum capacitor in location C3. Be sure to bend the capacitor as shown in figure#5 otherwise it will prevent you from soldering the PIC18F4520's 40-pin IC-Socket. Before soldering C3 you might want to test fit the 40-pin IC-Socket. C3 is used as a noise filtering capacitor for the PIC18F4520.

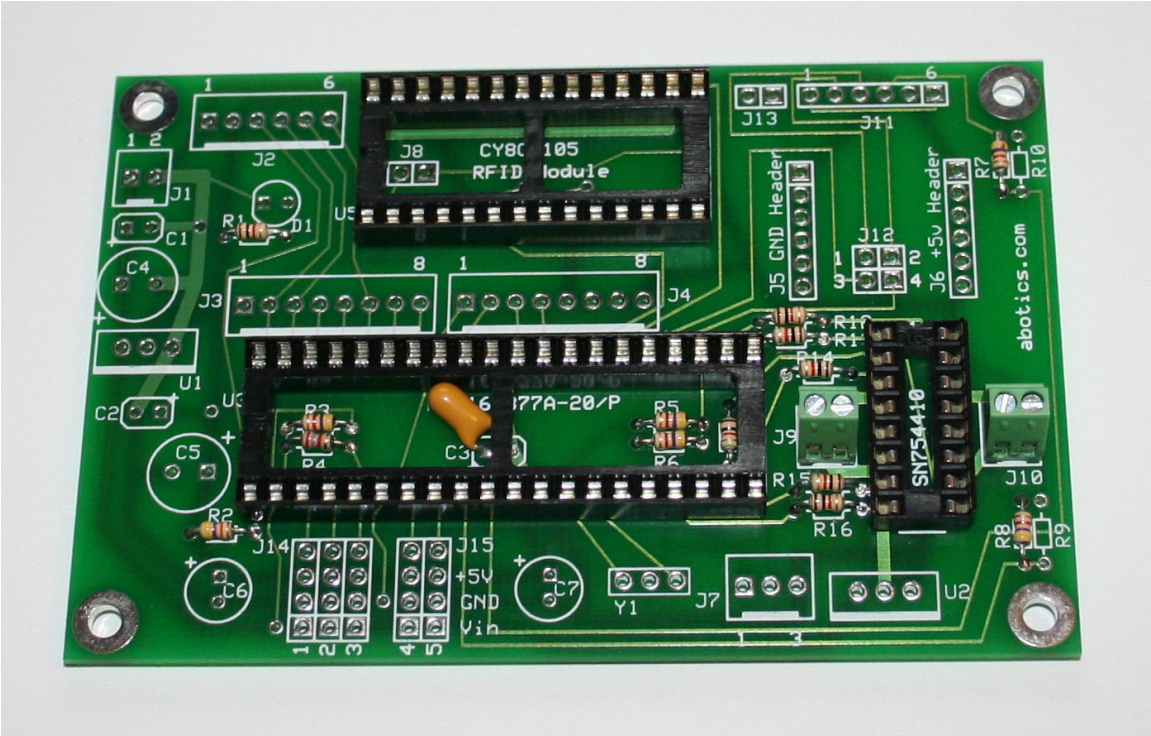
Step#6, Solder IC-Sockets:



Figure#6, Solder IC-Sockets.

In step#6 solder (3) IC-Sockets in the following locations: U3, U4, and U5. U3 receives the 40-pin socket, U4 receives the 16-pin and U5 receives the 28-pin. The 40-pin socket will house the PIC18F4520, the 28-Pin socket will house the CY8C0105 RFID Chip Module and the 16-pin socket will hold the SN754410 H-bridge.

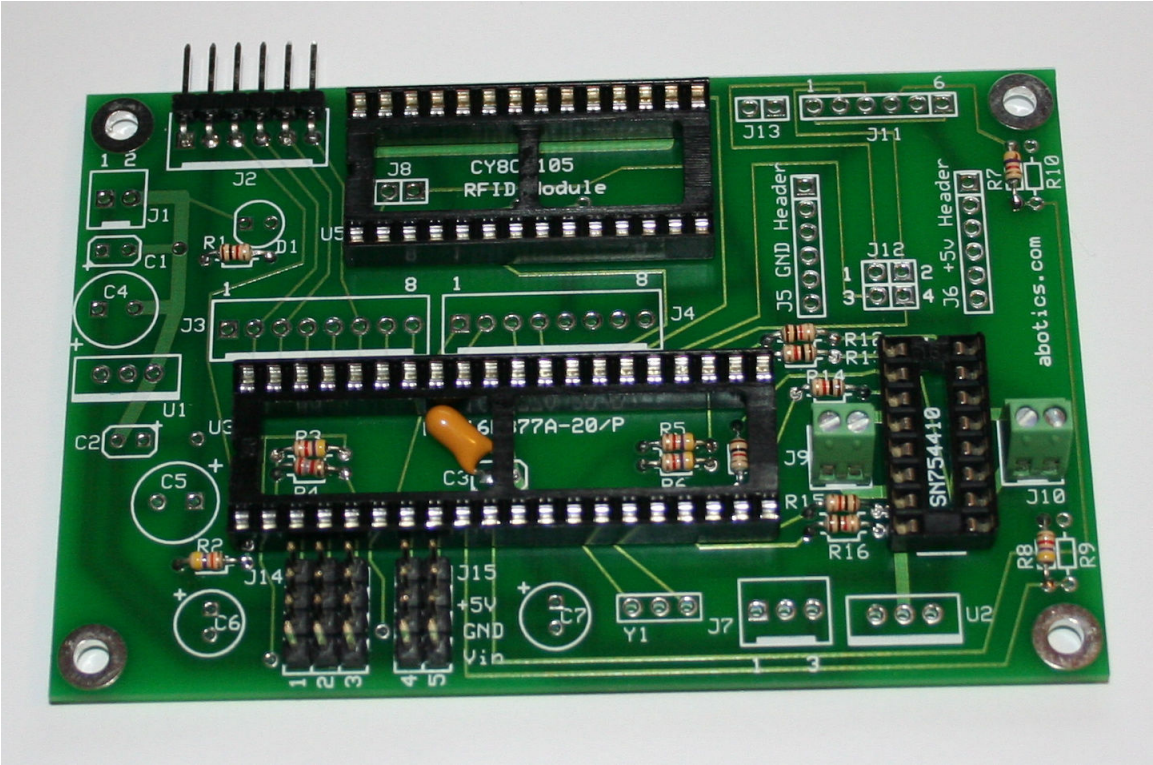
Step#7, Solder GM8 Motor Terminal Blocks:



Figure#7, Solder GM8 Terminal Blocks.

In step#7 solder (2) terminal blocks at locations J9 & J10. These terminal blocks provide a connection point for the GM8 gear motors. There are (2)-small pegs on the bottom of each terminal block. You will need to snip or cut these off so that the terminal block mounts flush with the PCB.

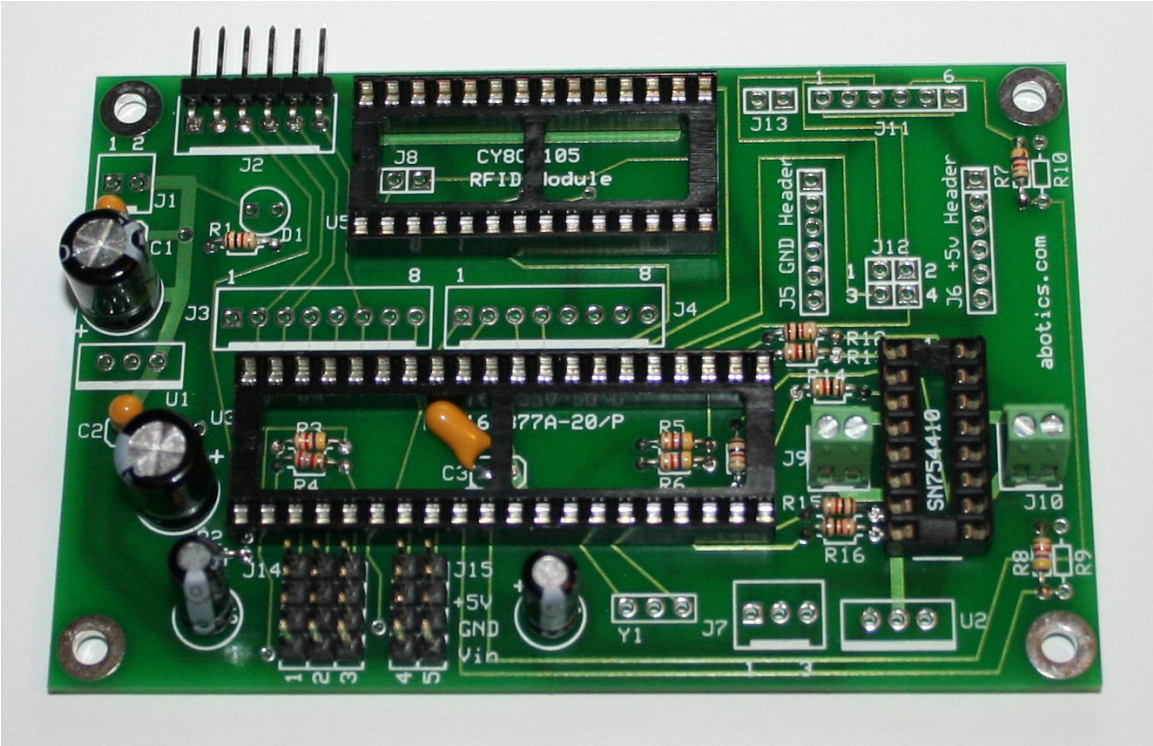
Step#8, Solder Non-Polarized Headers:



Figure#8, Solder Non-Polarized Headers.

In step#8 solder (5) 4-position non-polarized headers in the following locations of J14: 1, 2, 3 and J15: 4 & 5. These headers allow for the connection of devices that require an analog to digital (A/D) conversion, for example, the Sharp GP2D12 or GP2D120 Infrared Range Sensor. Solder the 6-position 90-degree non-polarized header in location J2. The J2 header provides In-Circuit Programming/Debugging access to the PIC18F4520

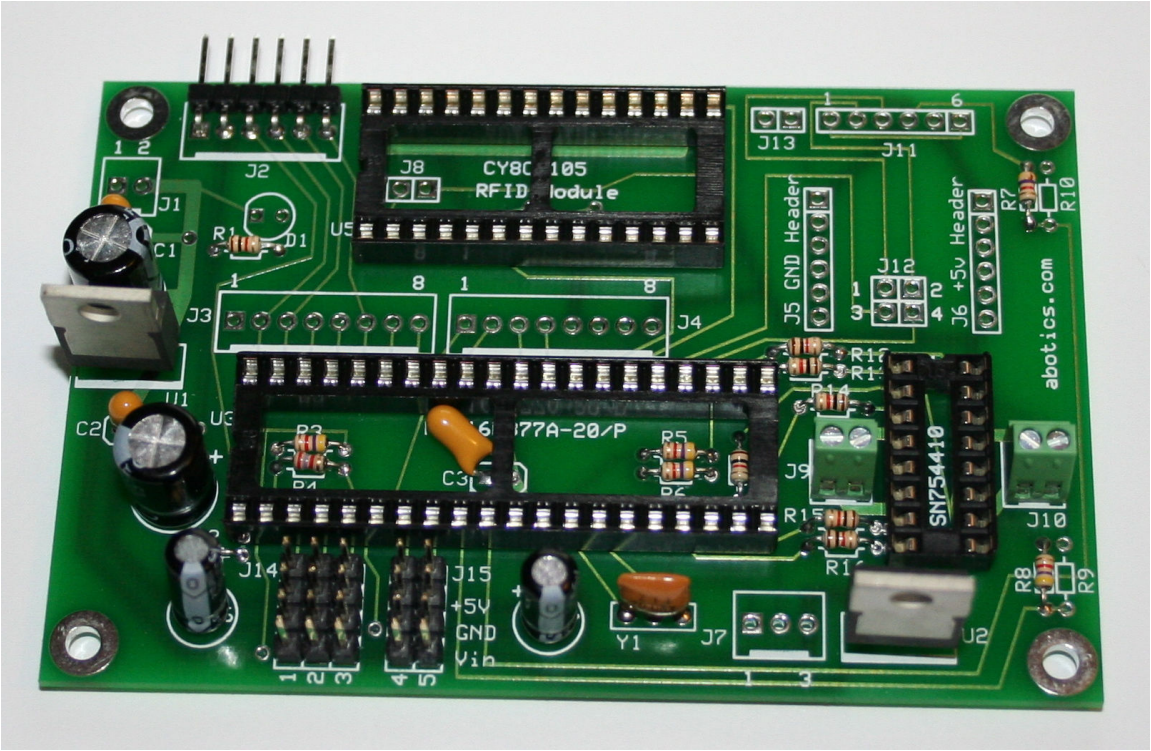
Step#9, Solder Remaining Capacitors:



Figure#9, Solder Remaining Capacitors.

In step#9 solder (2) 0.1µF tantalum capacitors in the following locations: C1 and C2. Then solder (2) 100µF capacitors in the following locations: C4 and C5 and finally solder (2) 33µF capacitors in the following locations: C6 and C7. C6 and C7 help to filter out any noise generated from the connection of Sharp GP2D12 or GP2D120 IR Sensors to the J14 & J15 headers.

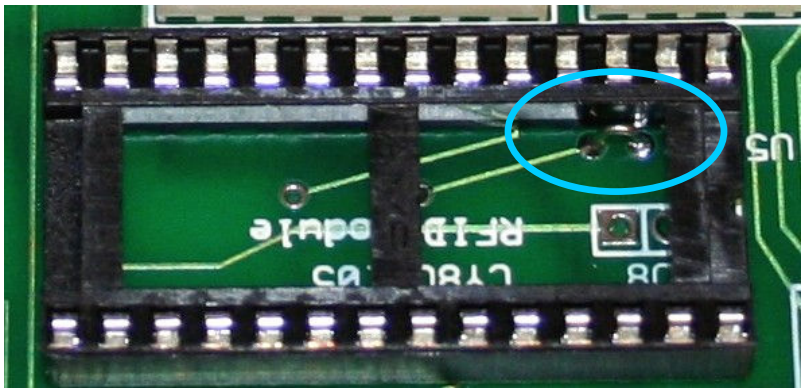
Step#10, Solder Voltage Regulators and Resonator:



Figure#10, Solder Voltage Regulators and 20Mhz Ceramic Resonator.

In step#10 solder (2) +5volt voltage regulators in the following locations: U1 and U2. Be sure to orient the regulators properly. Additionally, solder (1) 20Mhz ceramic resonator in location Y1. The three-pin 20Mhz resonator is not polarized and can therefore be soldered in either of the two possible orientations. The U1 regulator supplies +5 volts to all the logic level devices and the U2 regulator supplies +5 volts to the GM-8 motors. The 20 Mhz resonator clocks the PIC18F4520.

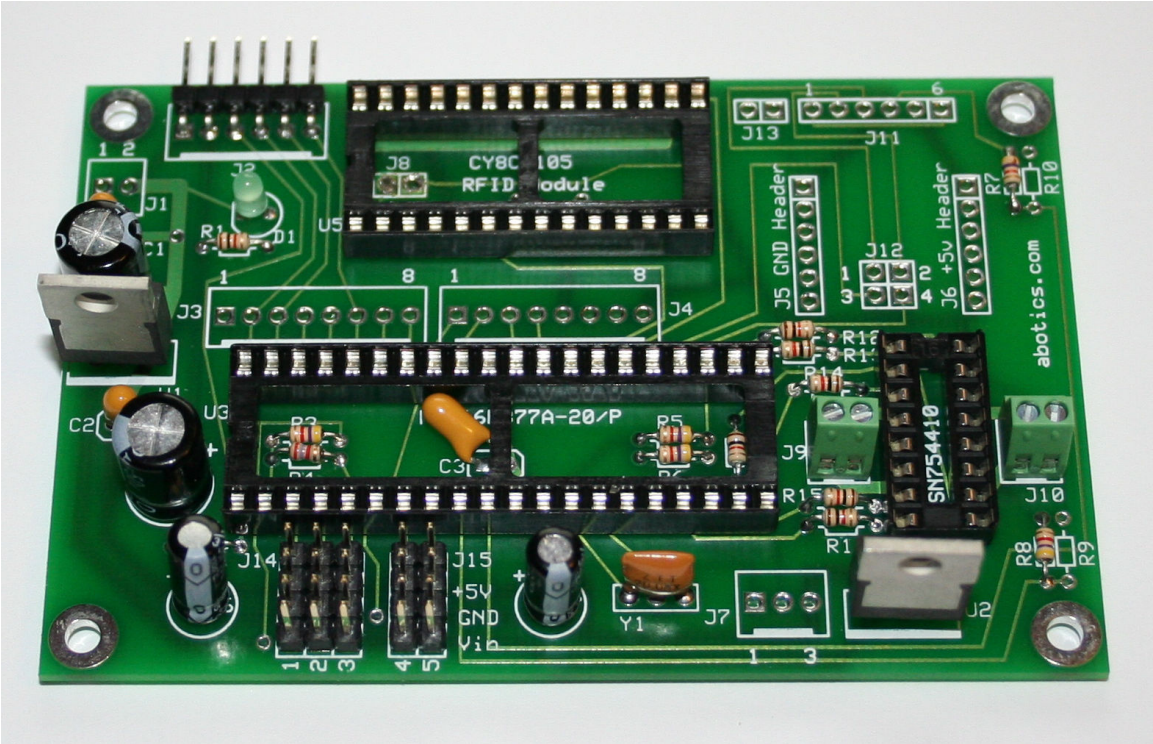
Step#11, Solder RFID Jumper Wire:



Figure#11, Solder RFID Jumper Wire.

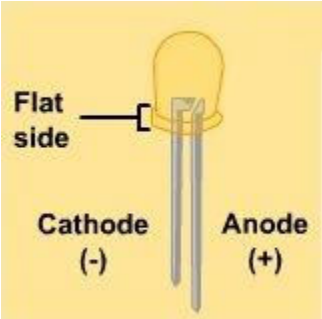
In step#11 solder the RFID jumper wire. From figure#11 you can see that the jumper must be soldered just above J8. You can use a piece of wire that was clipped from one if the resistors soldered earlier, but bend the wire into a small U-shape.

Step#12, Solder Green LED:



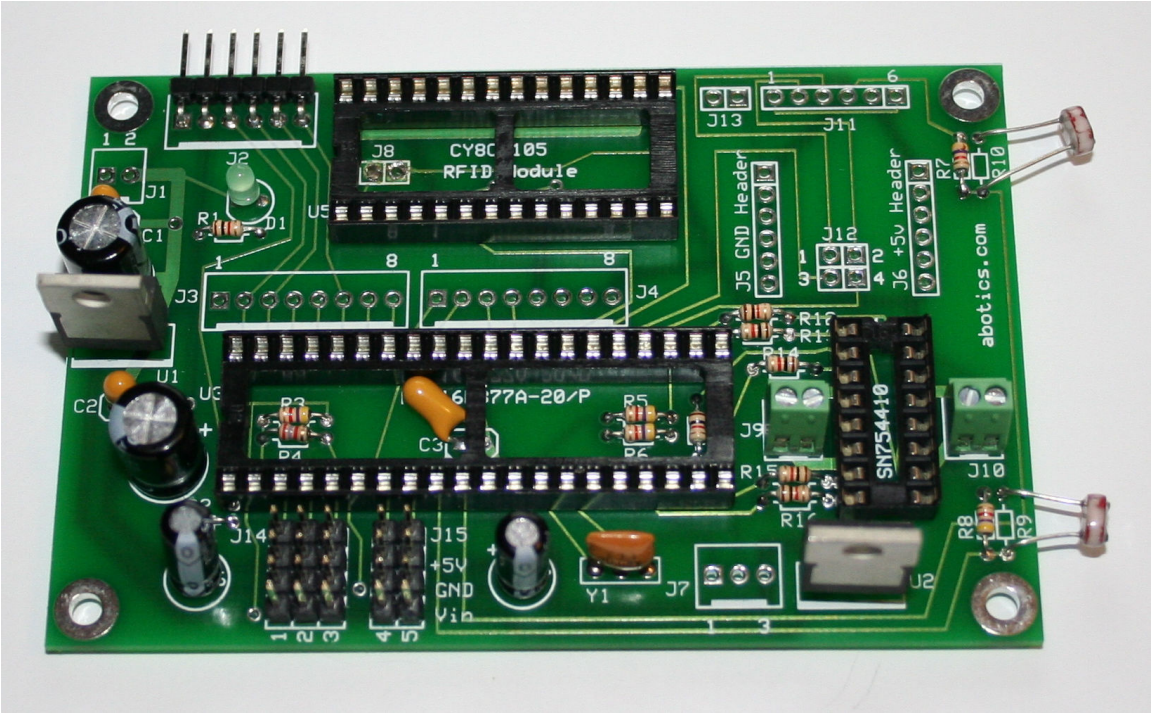
Figure#12a, Solder Green LED.

In step#12 solder the green LED in location D1. You should notice that the D1 outline on the board has one side with a flat spot; this flat spot corresponds to the negative or cathode terminal of the LED. The round side corresponds to the LED's anode or positive terminal. Typically the LED would have a flat spot on the bulb, but since we are using a small LED only the positive terminal can be identified as the longer one and must correspond to the round side of the D1 outline. Please refer to the LED illustration provided below in figure#12b.



Figure#15b, LED Illustration.

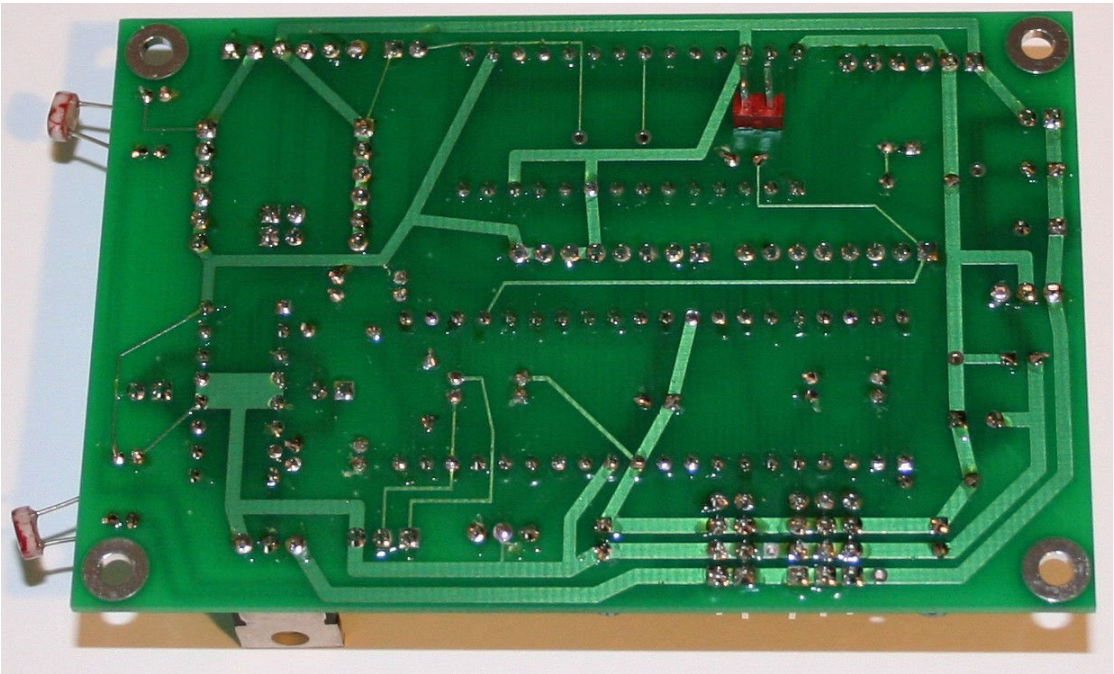
Step#13, Solder Cadmium Sulfide Photocells:



Figure#13, Solder Cadmium Sulfide Photocells.

In step#13 solder the cadmium sulfide photocells in locations: R9 and R10. You can bend these as you see fit, but I have bent mine to look left and right so that the direction of incident light can be determined.

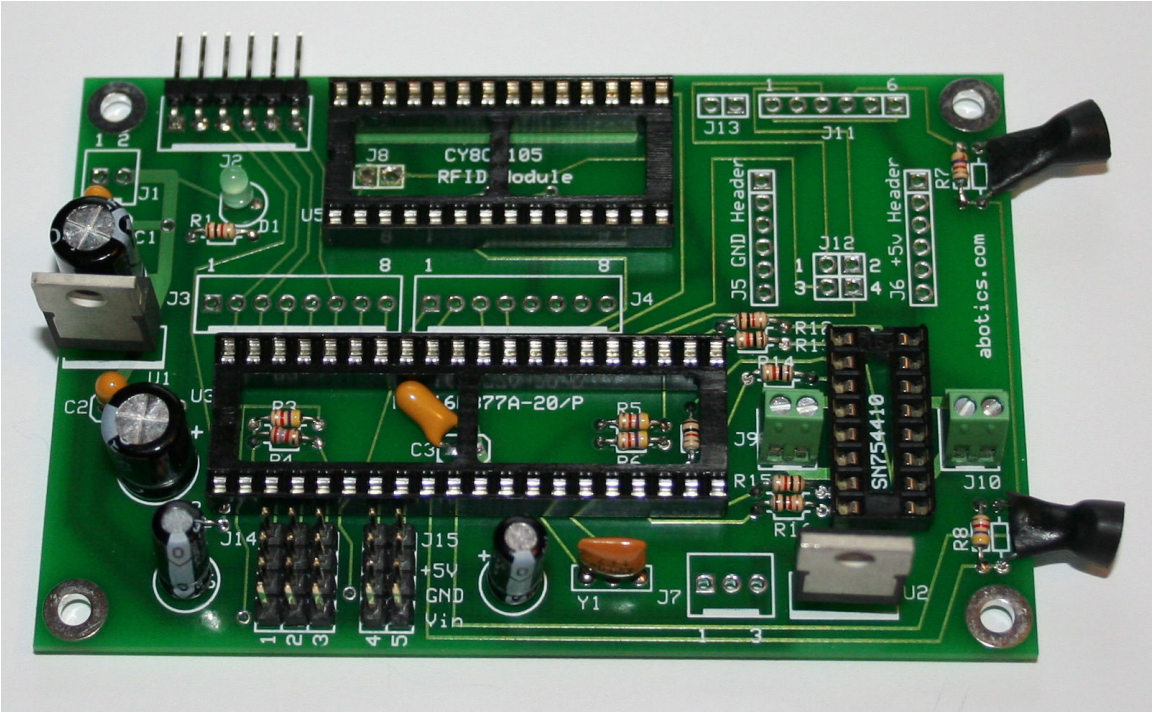
Step#14, Solder RFID Antennae Header:



Figure#14, Solder RFID Antennae Header.

In step#14 solder the 2-position non-polarized RFID antennae header in location J8. Figure#14 shows the bottom side of the board because the J8 RFID antenna header must be soldered on the bottom side, since the RFID chip module is to be installed on the top side of the board and would prevent you from connecting the antenna.

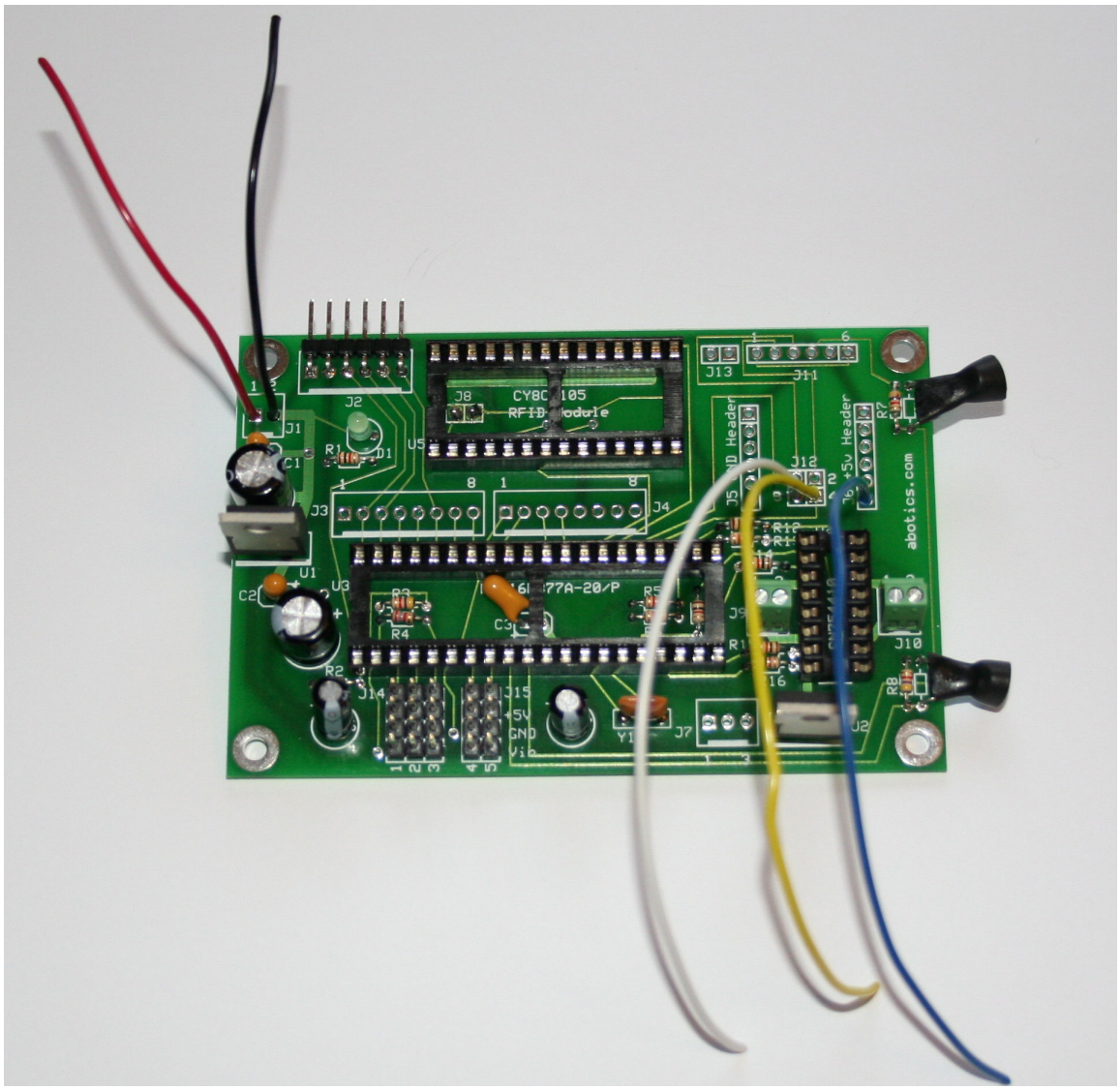
Step#15, Add Heat Sink Tube To Cadmium Sulfide Photocells:



Figure#15, Add Heat Shrink Tube to Cadmium Sulfide Photocells.

In step#15 add heat shrink tube to both of the cadmium sulfide photocells, so that they can be used to detect the direction of incoming light. If you decide to leave the heat shrink tube off the photocells will be less likely to detect the direction of say an incident flashlight beam or other light source.

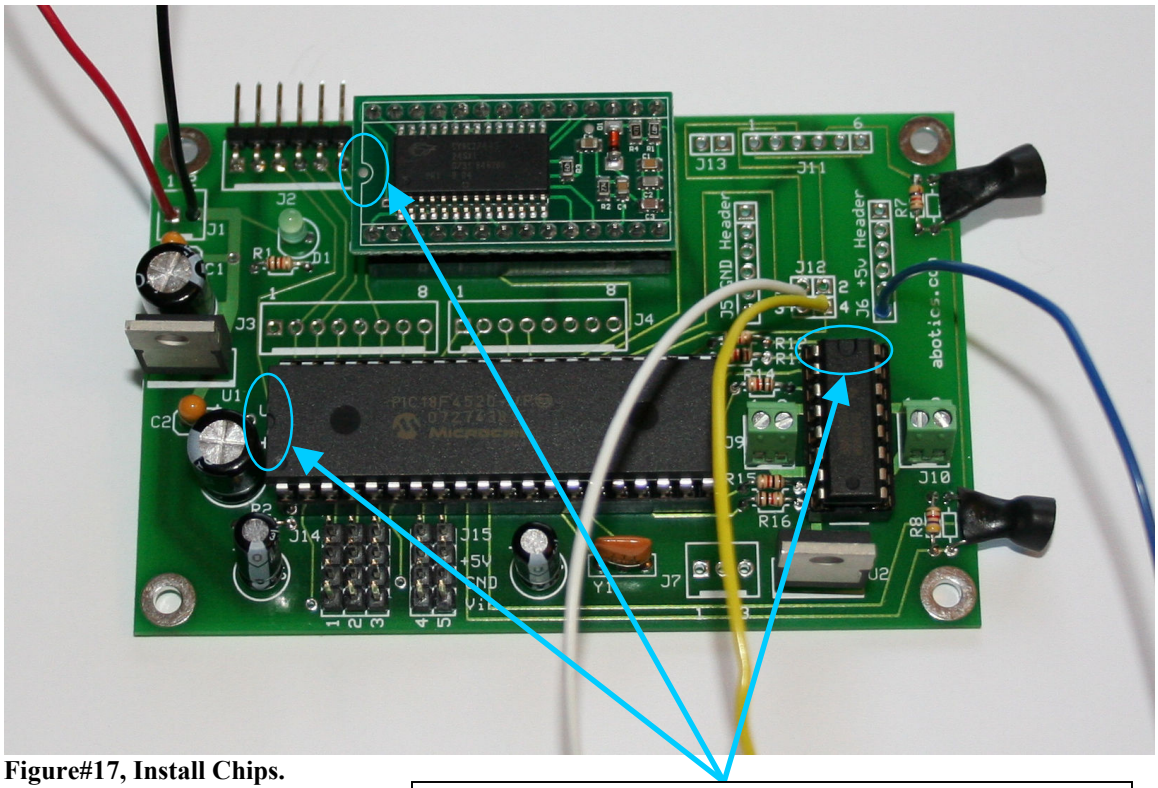
Step#16, Solder Power and PIC18F4520 UART Wires



Figure#16. Solder Power and PIC18F4520 UART Wires.

In this step you will be soldering the board power and PIC18F4520 UART wires, which will eventually connect to the MatchPort/XBee PCB. Strip back 1/8” and solder the red wire to pin#1 of J1 and the black wire to pin#2 of J1. Strip and solder the white wire to pin#3 of J12, the yellow wire to pin#4 of J12 and the blue wire to the +5volt header of J6.

Step#17, Install Chips:



Figure#17, Install Chips.

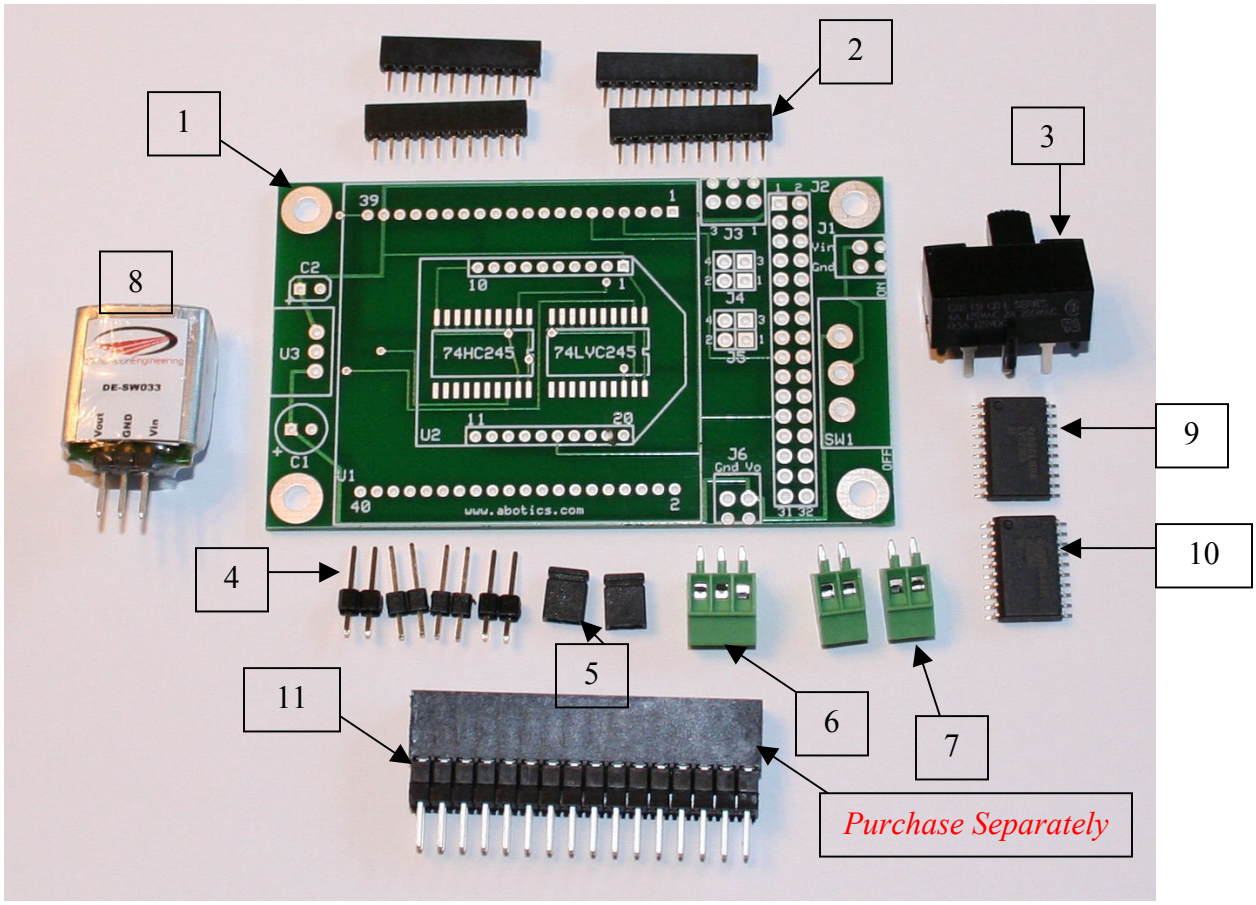
*Please note the chip orientations. The front end of a chip is typically denoted by a small U-shaped depression and pin#1 is usually located to the left of this mark.

In step#17 install the PIC18F4520, SN754410 and RFID Chip Module and (3) jumpers. Install the PIC18F4520 chip in the 40-pin socket (U3), the SN754410 chip in the 16-pin socket (U4) and the RFID chip in the 28-pin socket (U5). You might have to bend the pins on some of the chips to get them to insert into the respective socket, but be very careful not to over bend pins as they can fracture and break off yielding the chip useless.

NOTE: You should clean the solder flux from your board prior to installing the chips. If you used a water-soluble flux then you can simply clean with water and scrub with an old toothbrush. Otherwise, if you used alcohol-soluble flux you may need to clean the flux with isopropyl alcohol. If you used a non-clean flux then you are already done.

Step#18, Review OPEN-ROBOT MatchPort/XBee PCB Kit Contents:

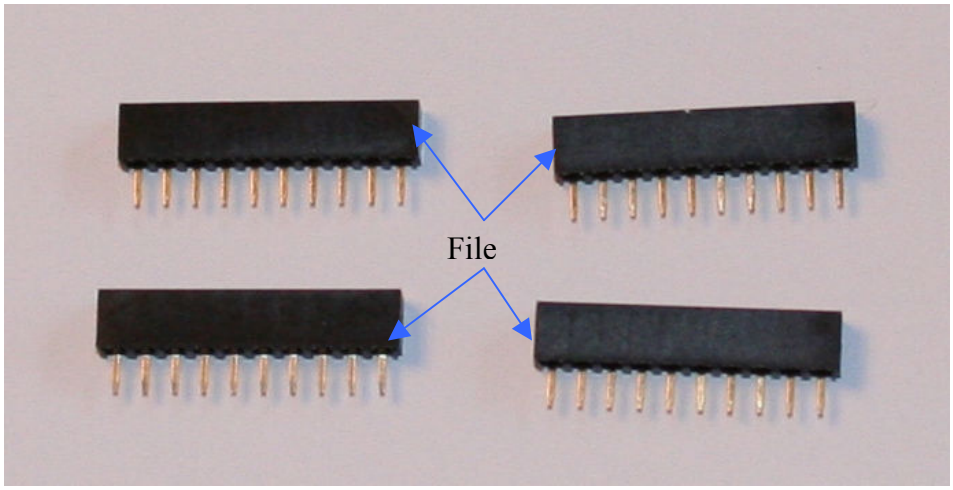
1. (1) – OPEN-ROBOT MatchPort/XBee PCB
2. (4) – 2mm pitch MatchPort/XBee sockets, U1 headers
3. (1) – SPST switch, SW1
4. (4) – 0.1” pitch 2-position non-polarized headers, J4 & J5
5. (2) – 0.1” pitch jumper
6. (1) – 0.1” pitch 3-position terminal, J3
7. (2) – 0.1” pitch 2-position terminal block, J1 & J6
8. (1) – DE-SW033 or RECOM 3.3volt switching regulator
9. (1) – 74LVC245 octal buffer
10. (1) – 74HC245 octal buffer
11. (1) – 32-position socket for connecting SRV1 Camera Board, J2 (*purchase separately*)
12. (1) – 100uF Electrolytic capacitor *(only with RECOM)*
13. (1) – 0.1uF Tantalum capacitor *(only with RECOM)*



Figure#18. Review Kit Contents.

Step#19, Prepare the 2mm pitch MatchPort/XBee sockets:

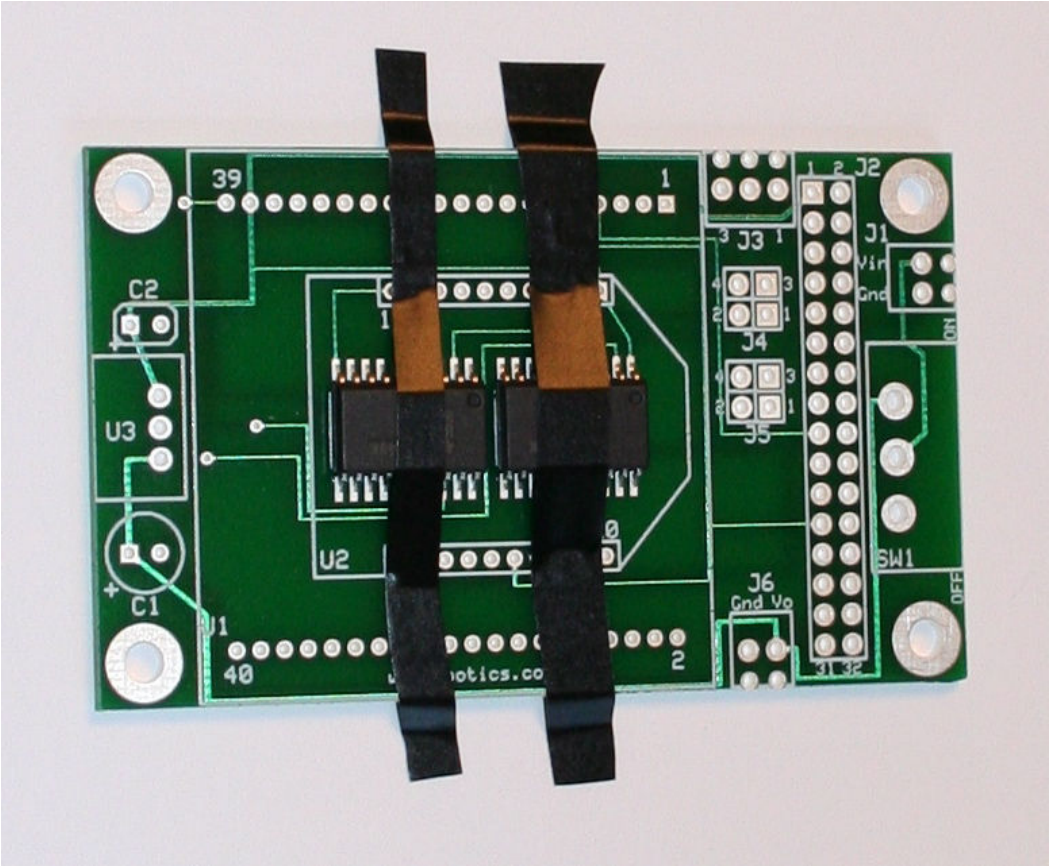
NOTE: Skip this step if you are using the XBee ZigBee module.



Figure#19. File ends of 2mm MatchPort/XBee sockets.

You will need to slightly file or sand one end on each of the 2mm pitch MatchPort/XBee sockets so that they fit on the PCB. Be careful not to file too much of the plastic otherwise the metal pin will be exposed. You only need to perform this step if you are using the MatchPort b/g module.

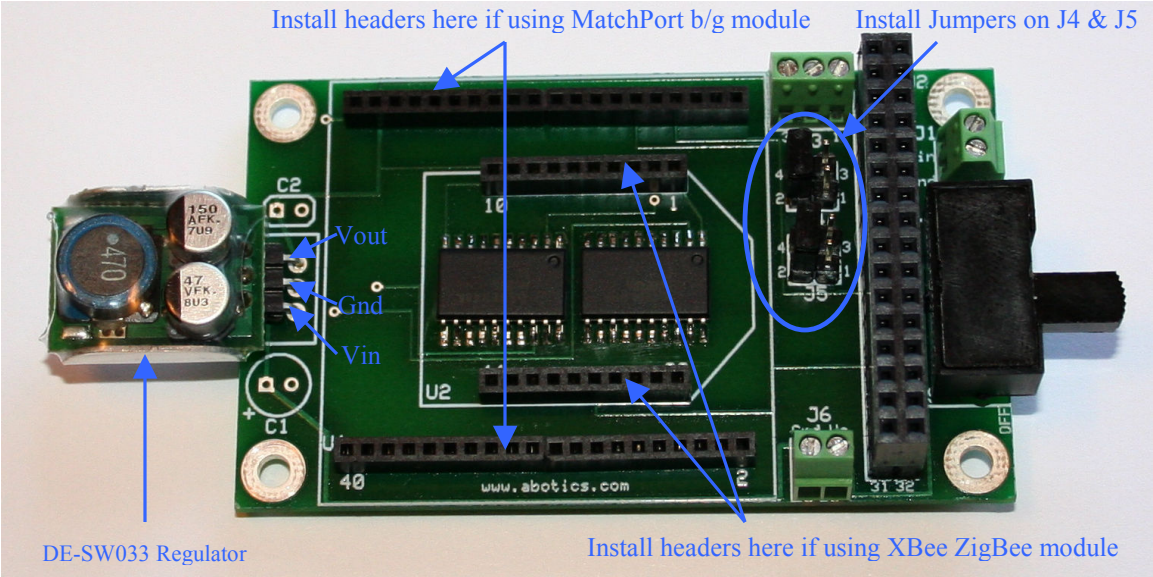
Step#20, Solder 74LVC245 and 74HC245 Octal Buffer:



Figure#20. Solder 74LVC245 and 74HC245 Octal Buffers.

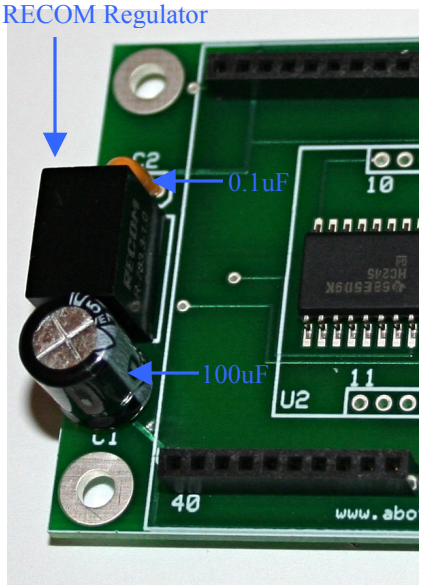
The 74LVC245 and 74HC245 chips are fine pitch SOIC chips and are not as easy to solder as say a 0.1" PDIP component. However, there is something that will make this a lot easier. Simply cut two small pieces of tape and then use these to secure each chip to the PCB and also to your work surface. Be sure to orient the chips as shown and in their proper location on the board. Now you can easily solder using 0.015" diameter solder (RadioShack#64-035) and a fine tip soldering iron. Don't worry if you accidentally solder-bridge two pins together during the solder process because in the end you can use a piece of de-soldering braid (RadioShack#64-2090) to remove the excess solder.

Step#21, Solder Remaining Components:



Figure#21a. Solder remaining components.

Solder the remaining components according figure#21. If you are going to add the SRV1 Camera Board then you will need to bend the DE-SW033 pins 90 degrees so that it won't interfere. Also be sure to add the 0.1" jumpers to J4 and J5. If you are adding the SRV1 Camera Board, then attach the jumpers to pins 1&3 on both J4 and J5. Otherwise attach the jumpers to pins 2&4 on both J4 and J5. Figure#21a shows the jumpers attached to pins 2&4 and is therefore configured for normal non-SRV1 operation.

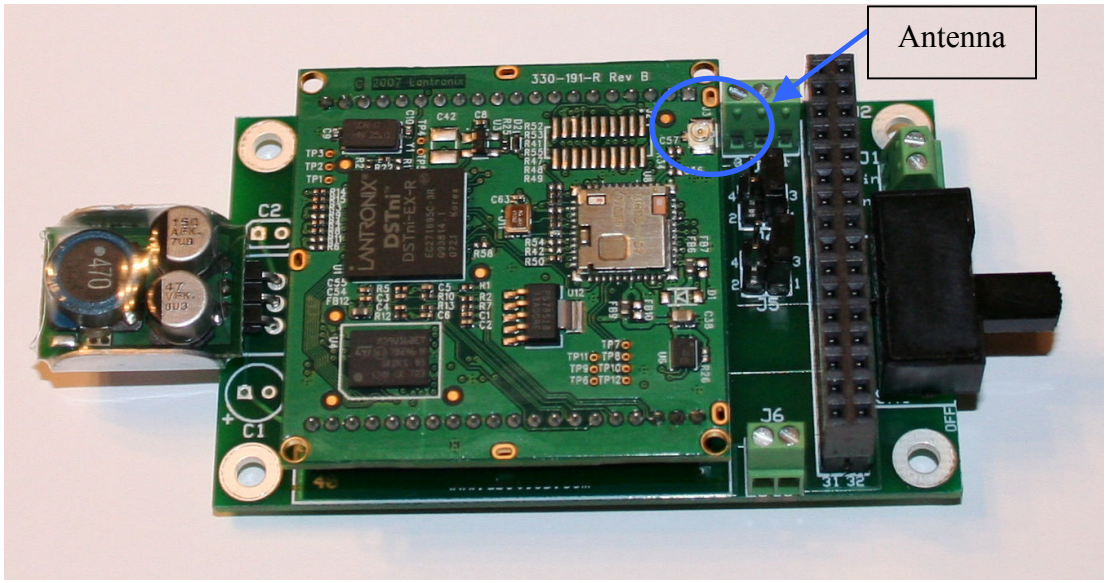


Figure#21b. RECOM 3.3 volt regulator installation.

NOTE: If your kit has a RECOM 3.3 volt regulator instead of the DE-SW033, then install as shown in figure#21b. Be sure to solder the RECOM regulator such that the RECOM text is facing the HC245 octal buffer. You will also need to solder a 100uF electrolytic capacitor in location C1 and a 0.1uF tantalum capacitor in location C2.

NOTE: You should clean the solder flux from your board prior to installing the MatchPort b/g module.

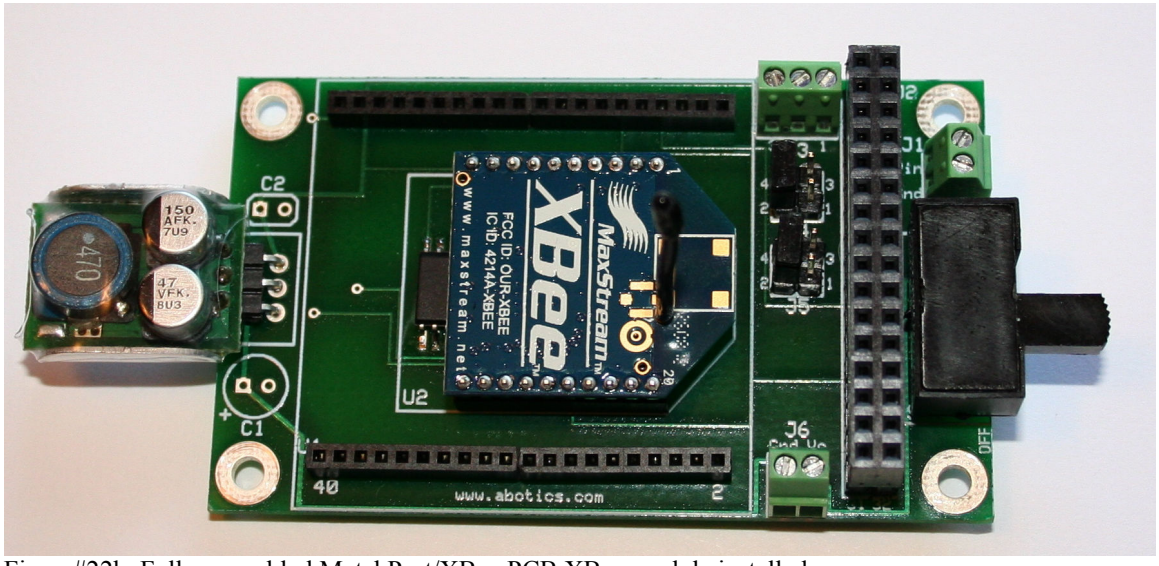
Step#22a, Install MatchPort b/g Module (purchase separately):



Figure#22a. Fully assembled MatchPort/XBee PCB with MatchPort b/g installed.

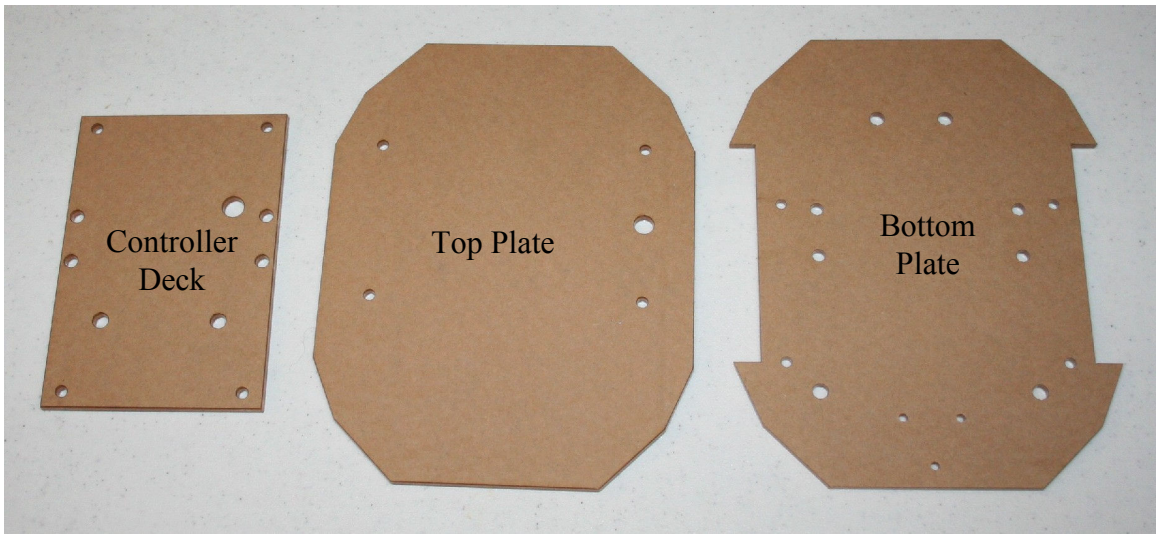
Install the MatchPort b/g module by orientating the antenna clip towards the 3-position terminal block, J3. Be sure to properly align the pins before firmly pressing into place. Please refer to figure#22a. If you are using the XBee ZigBee module, then refer to figure#22b. The remaining documentation will display the MatchPort b/g. If you are using the XBEE module simply ignore the MatchPort b/g.

Step#22b, Install XBee ZigBee Module (purchase separately):



Figure#22b. Fully assembled MatchPort/XBee PCB XBee module installed.

Step#23, Assemble OPEN-ROBOT Body:

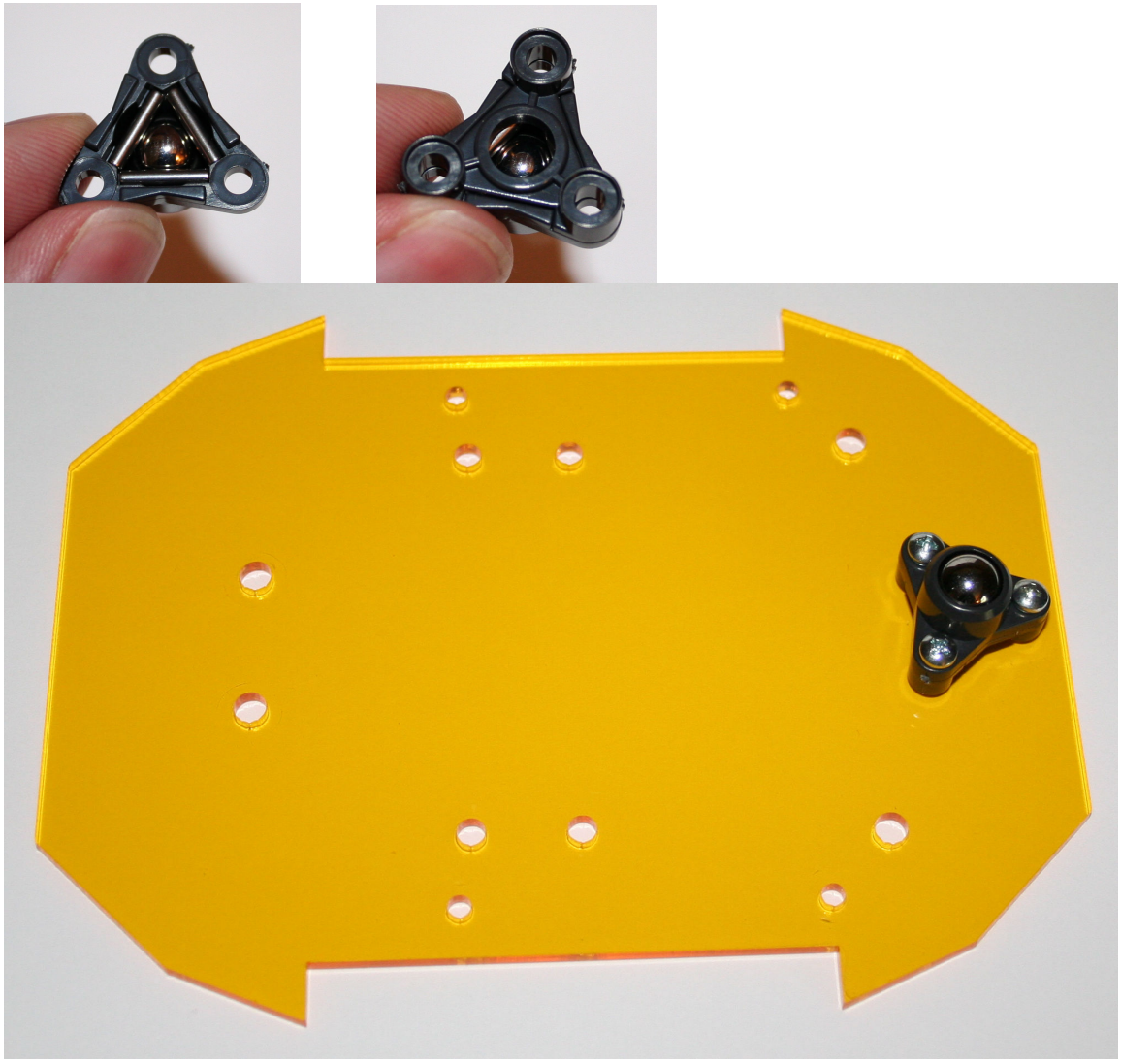


Figure#23, Prepare OPEN-ROBOT body pieces.

The first step in assembling the OPEN-ROBOT's body is to prepare the acrylic body pieces. You need to peel off the brown protective paper coating from each piece so that we can begin the assembly process.

NOTE: Please note that the color of your body pieces may vary.

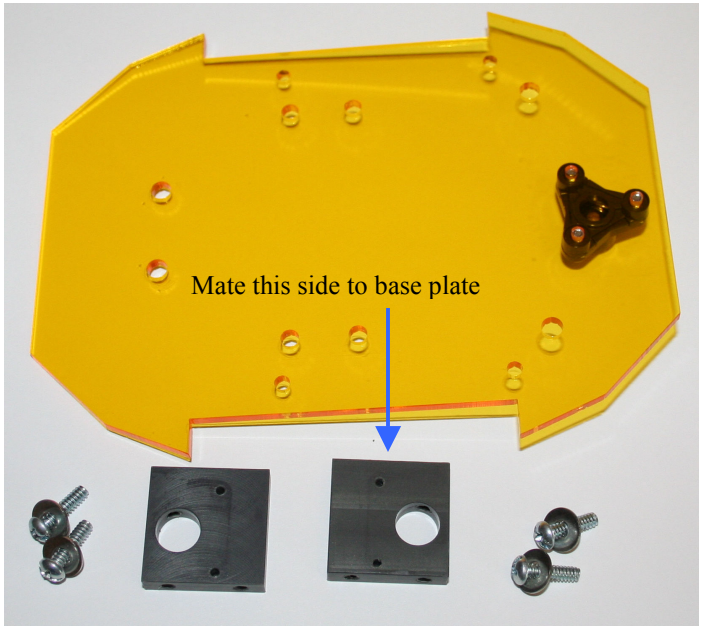
Step#24, Assemble and Attach Rear Caster Wheel:



Figure#24, Assemble and mount rear caster wheel.

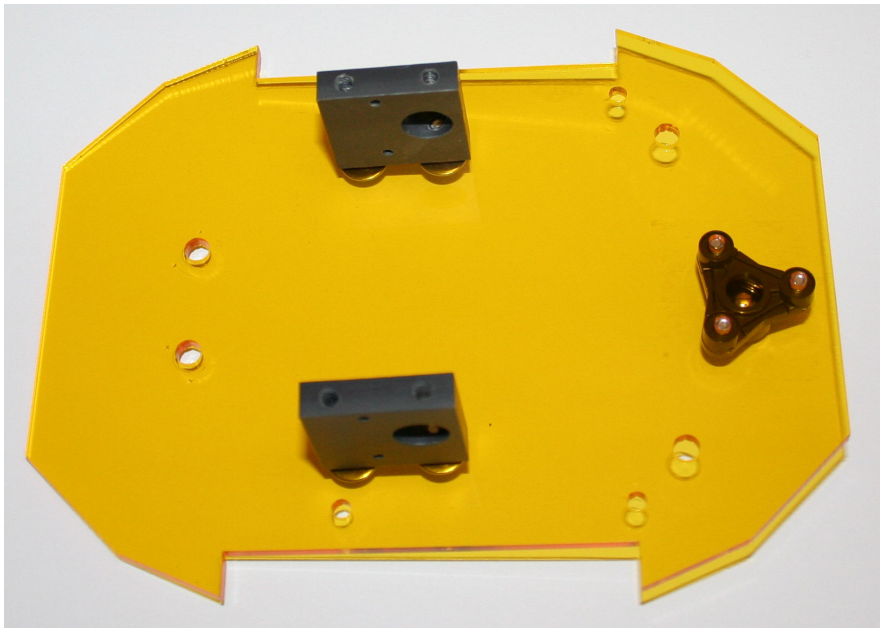
To assemble the caster wheel you need to first insert the metal roller ball then add the (3)-needle rollers and finally attach the (3)-hole cover plate. Use the (3) #4-40x3/8" long machine screws to attach the plastic caster wheel to the base plate.

Step#25, Attach GM8 Motor Mounts:



Figure#25a, Attach GM8 motor mounts to base plate.

In step#25 attach each GM8 motor mount using (4) #6-32x1/2" long machine screws and (4) #6 flat washers. The GM8 mounts must mate on the side of the base plate that is opposite to the caster wheel. If you look closely on each GM8 mount you will notice that one of the #2-56 threaded holes is drilled further away from the edge. This side must be mated to the base plate. Refer to figure#25a if you are unsure.

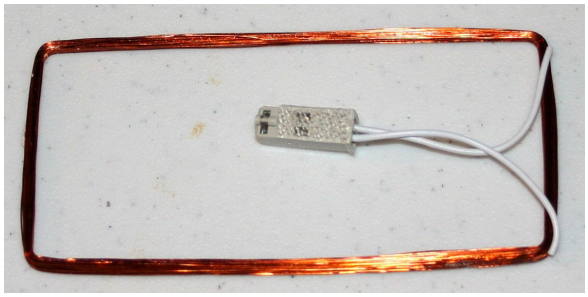


Figure#25b, Attach GM8 motor mounts to base plate.

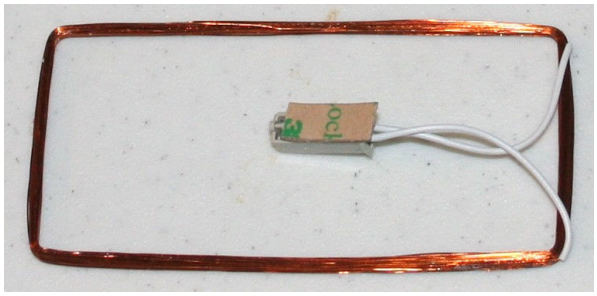
Step#26, Prepare to Attach RFID Antenna (purchase separately):

Figure#26a, Prepare to attach RFID antenna.

In step#26 attach a small piece of the 3M Dual Lock® tape to the plastic connector on the RFID antenna. After attaching the first piece, cut a second piece and snap it onto the first piece. Be very careful when handling the RFID antenna because it is very fragile.

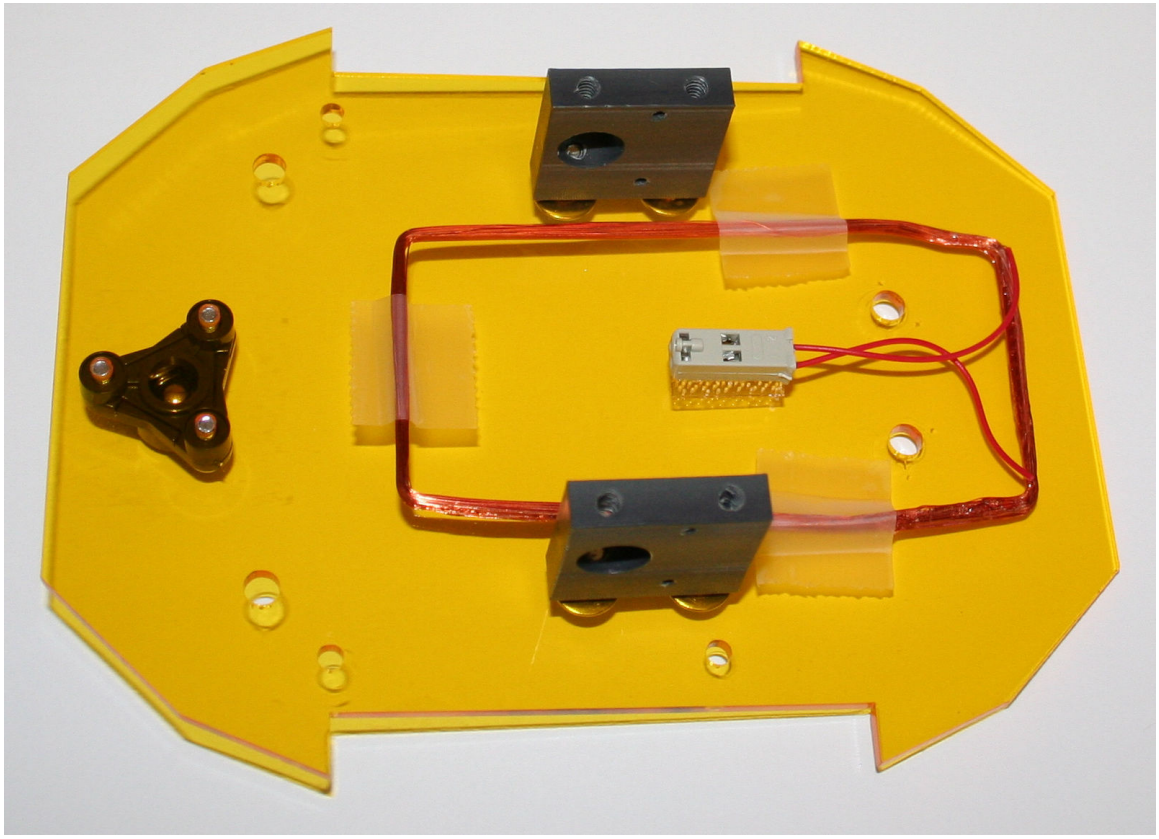


Figure#26b, Attach small piece of tape to connector.



Figure#26c, Cut second piece of tape and snap onto first piece.

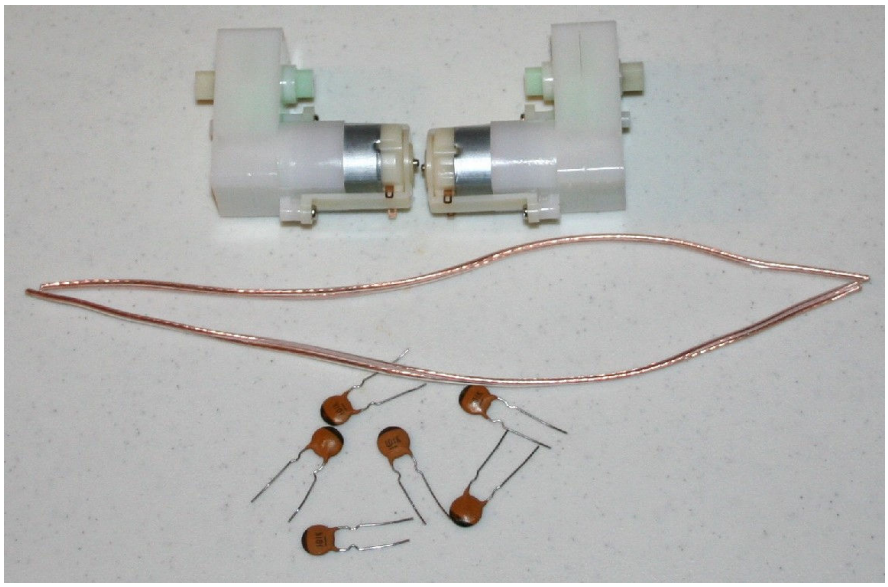
Step#27, Attach RFID Antenna to Base Plate:



Figure#27, Attach RFID antenna to base plate.

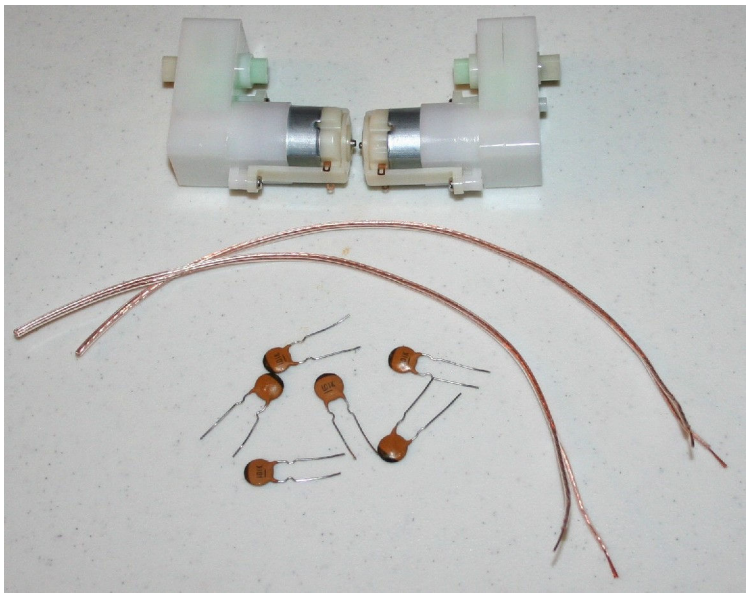
In step#27 peel the paper backing off of the piece of Dual Lock tape on the antenna connector and carefully locate the antenna on the base plate and once you have it in position firmly press the plastic connector onto the base. The antenna should be centered in between the two GM8 mounts and the front edge of the antenna should be approximately 1/8" –1/4" from the front edge of the base plate. Finally secure the antenna to the base plate using three pieces of clear plastic tape.

Step#28, Prepare to Solder Noise Filtering Capacitors (Optional):



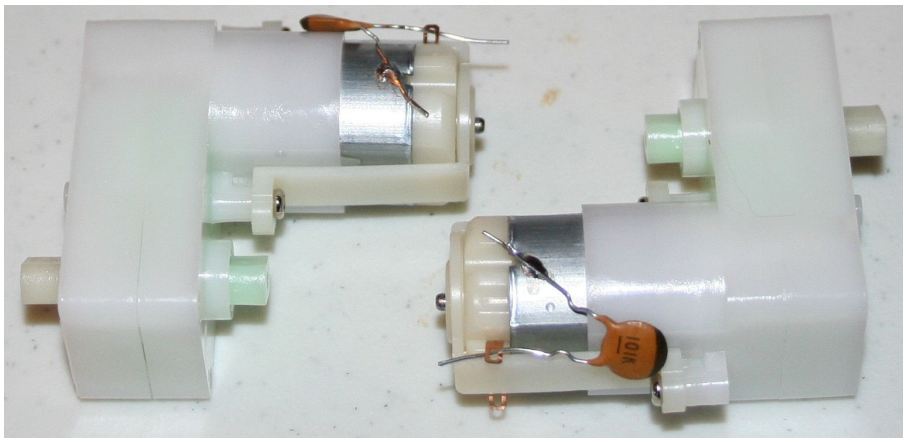
Figure#28a, Prepare to solder noise filtering capacitors to GM8 motors.

First separate and strip back the ends of your 8” long clear motor wires. You will need to separate each conductor by cutting the insulator in between and then peeling the two conductors apart. Strip back approximately 1/8”-3/16” ***Note: The noise filtering capacitors are only needed if you plan to install the WW02 Wheel Encoders.***



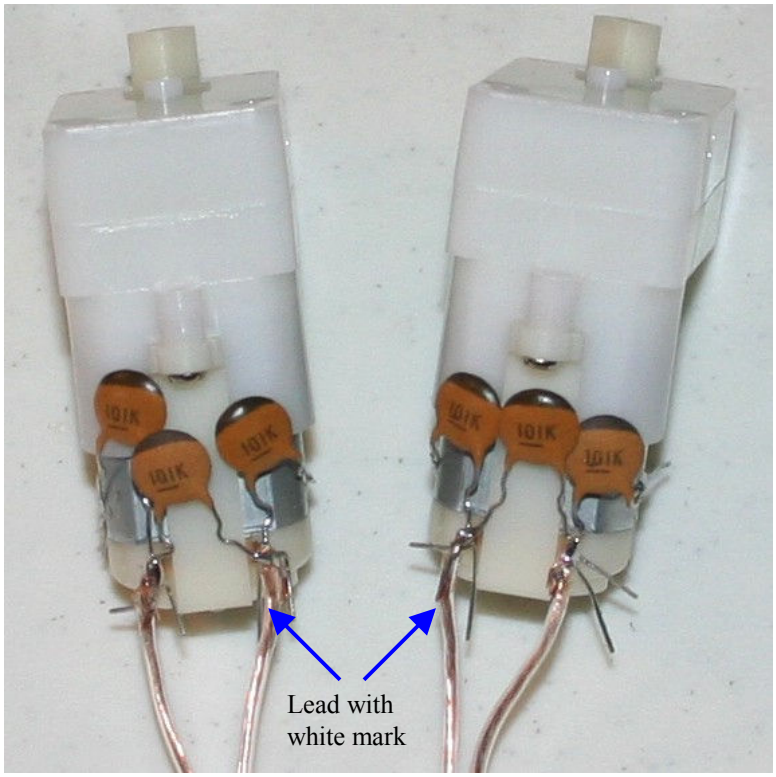
Figure#28b, Strip 8” long GM8 motor leads and peel apart.

Step#29, Solder Noise Filtering Capacitors:



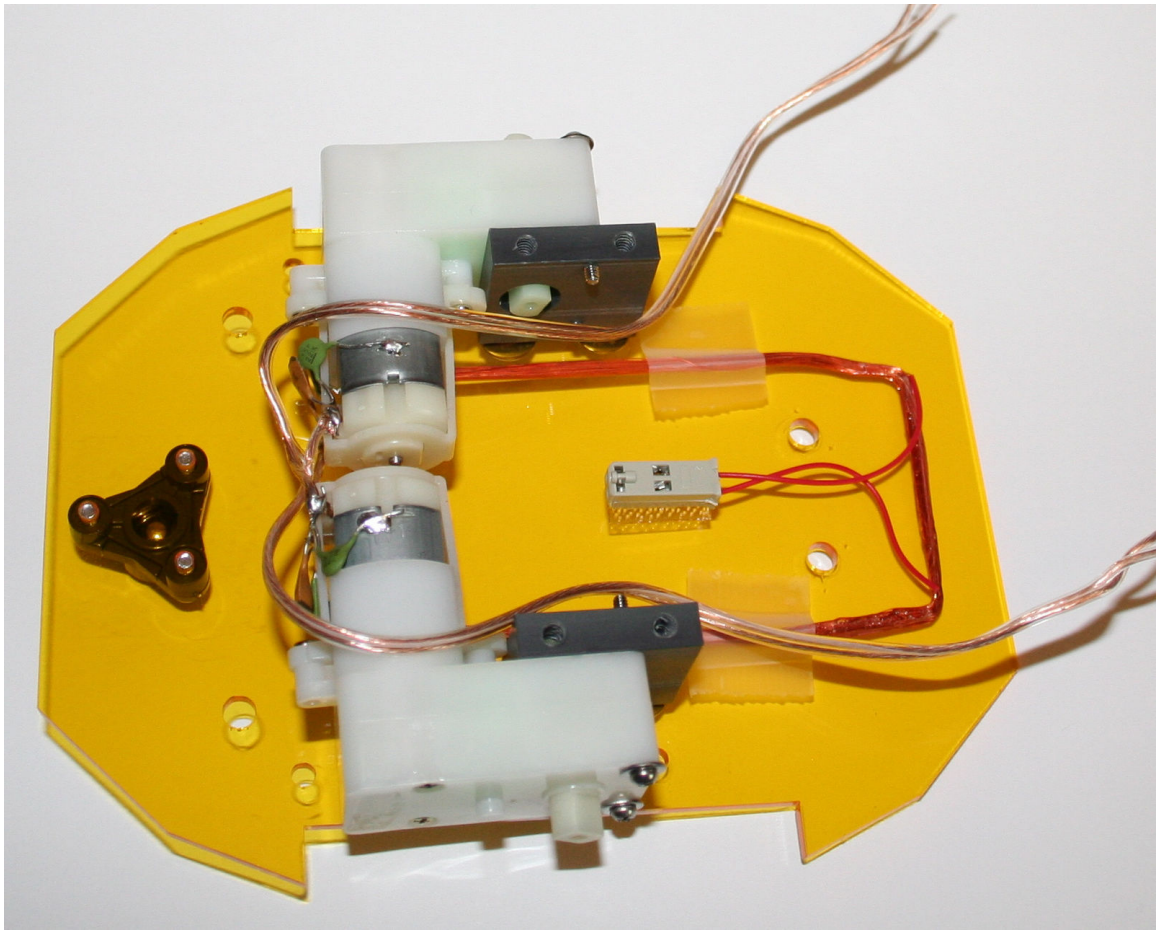
Figure#29a, Solder 100pf ceramic capacitors.

Insert one leg of a 100pf ceramic capacitor into one of the metal GM8 motor tabs and then solder the other capacitor leg to the case of the GM8 motor. You will need to do this twice on each motor. Don't solder the leg that was inserted into the motor tab yet. Take a third capacitor and insert one leg into one of the motor tabs and the other leg into the second motor tab. Finally insert the striped ends of the 8" motor lead into the motor tabs as shown in figure#29b and solder. Be sure to insert the leads with the white marker on the clear insulator into the appropriate motor tab.



Figure#29b, Solder 100pf ceramic capacitors and 8" motor leads.

Step#30, Attach GM8 Motors:

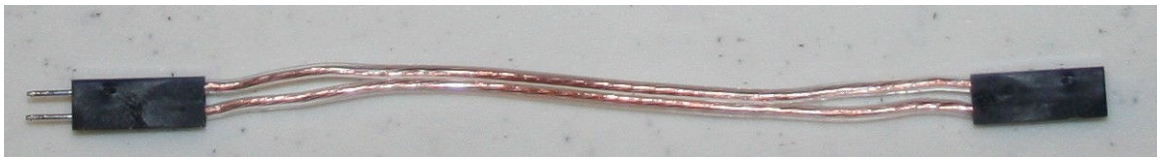


Figure#30, Attach GM8 motors.

Insert and press the GM8 motors into the GM8 mounts. Be sure to mount the motors with the white marked motor lead on the topside away from the base plate. Use the four supplied #2-56x1" machine screws and #2 washers to secure the GM8 motors to the mounts.

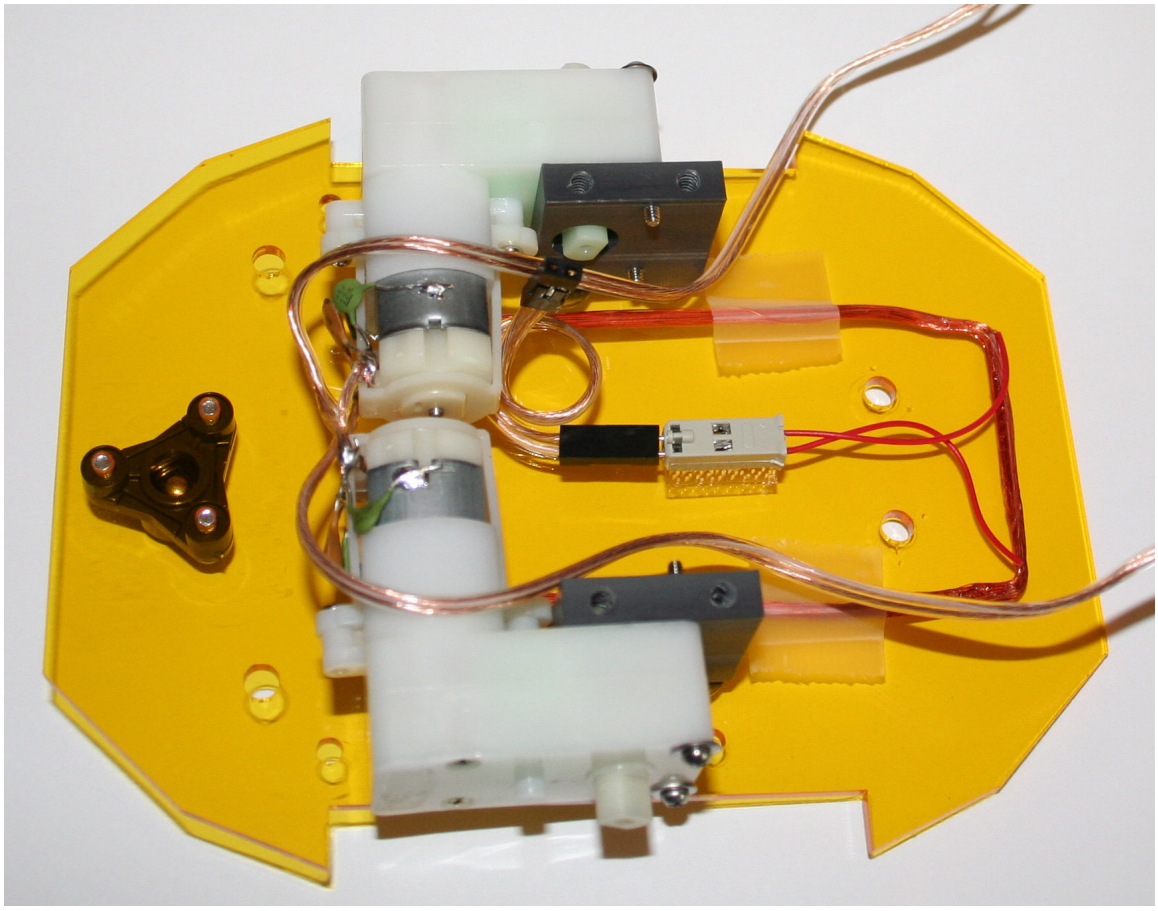
Step#31, Prepare RFID Antenna Cable (purchase separately):

In step#31 prepare to attach the RFID Antenna cable. This cable will connect the RFID antenna to the bottom of the controller board, J8. The female end will later attach to the bottom of the controller board, J8. The male end will connect to the RFID antenna.



Figure#31, RFID antenna cable.

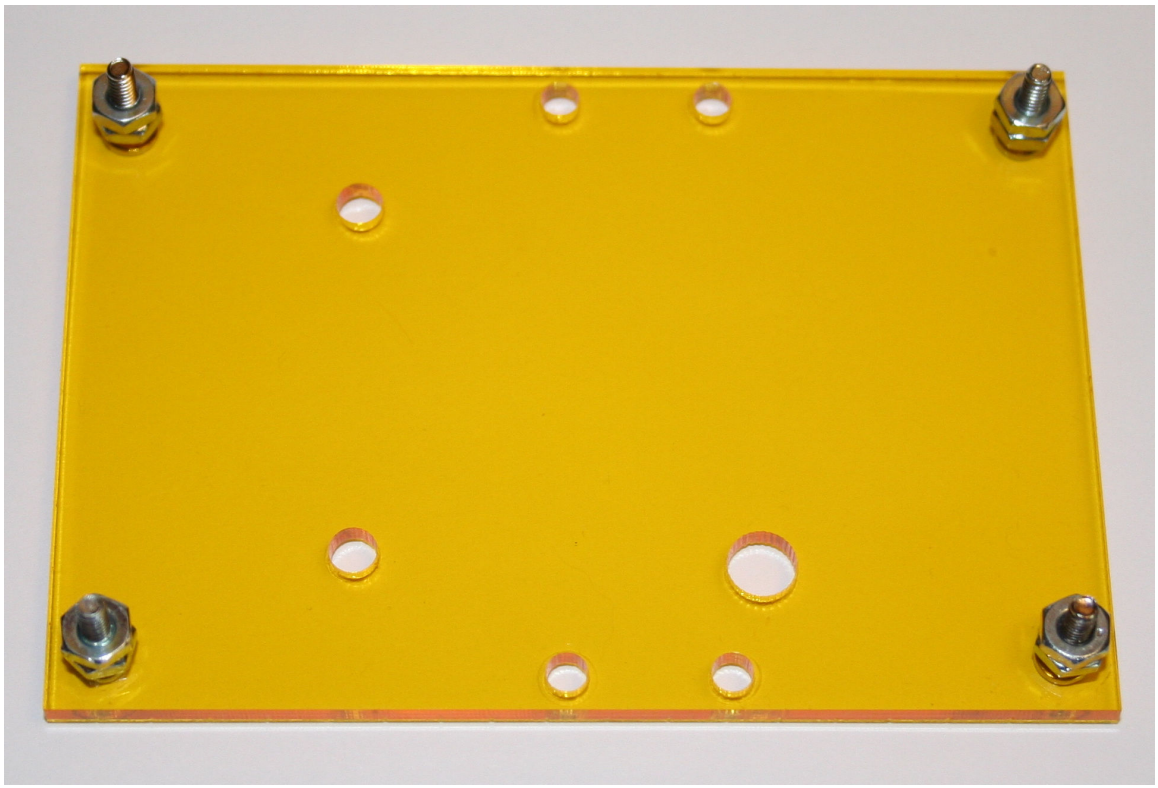
Step#32, Attach RFID Antenna Cable & Prepare to Mount Controller Deck:



Figure#32, Attach RFID antenna cable.

Insert the male end of the RFID antenna cable into the antenna connector and bend the cable slightly upwards as shown in figure#32. Be careful when plugging the RFID cable into the RFID antenna connector because the RFID antenna wires are delicate.

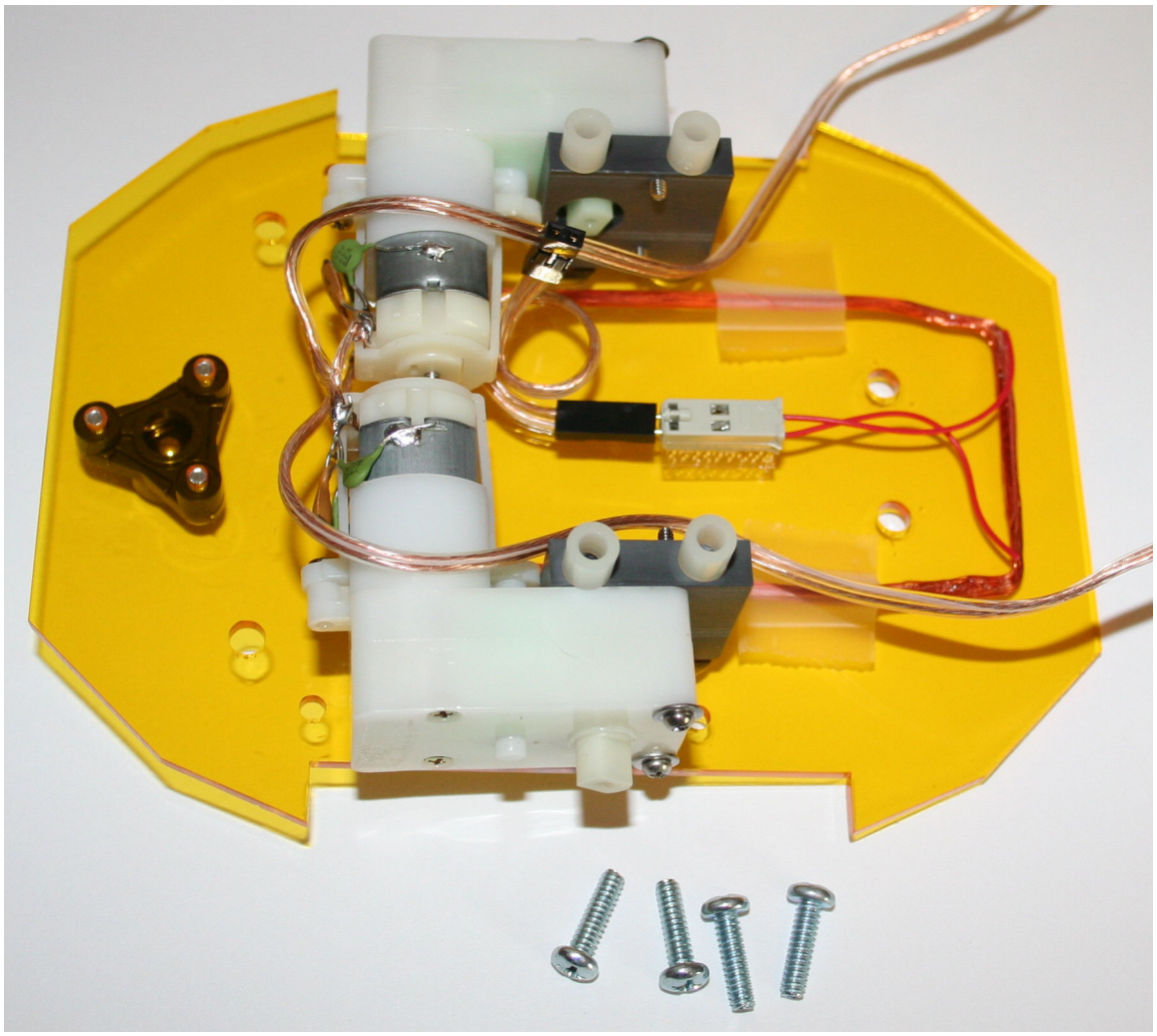
Step#33, Prepare Controller Deck:



Figure#33, Prepare Controller Deck.

Prepare the controller deck by attaching the (4) #4-40 machine screws. Use (2) #4-40 nuts on each screw so that there is enough clearance for the PIC18F4520 Controller Board.

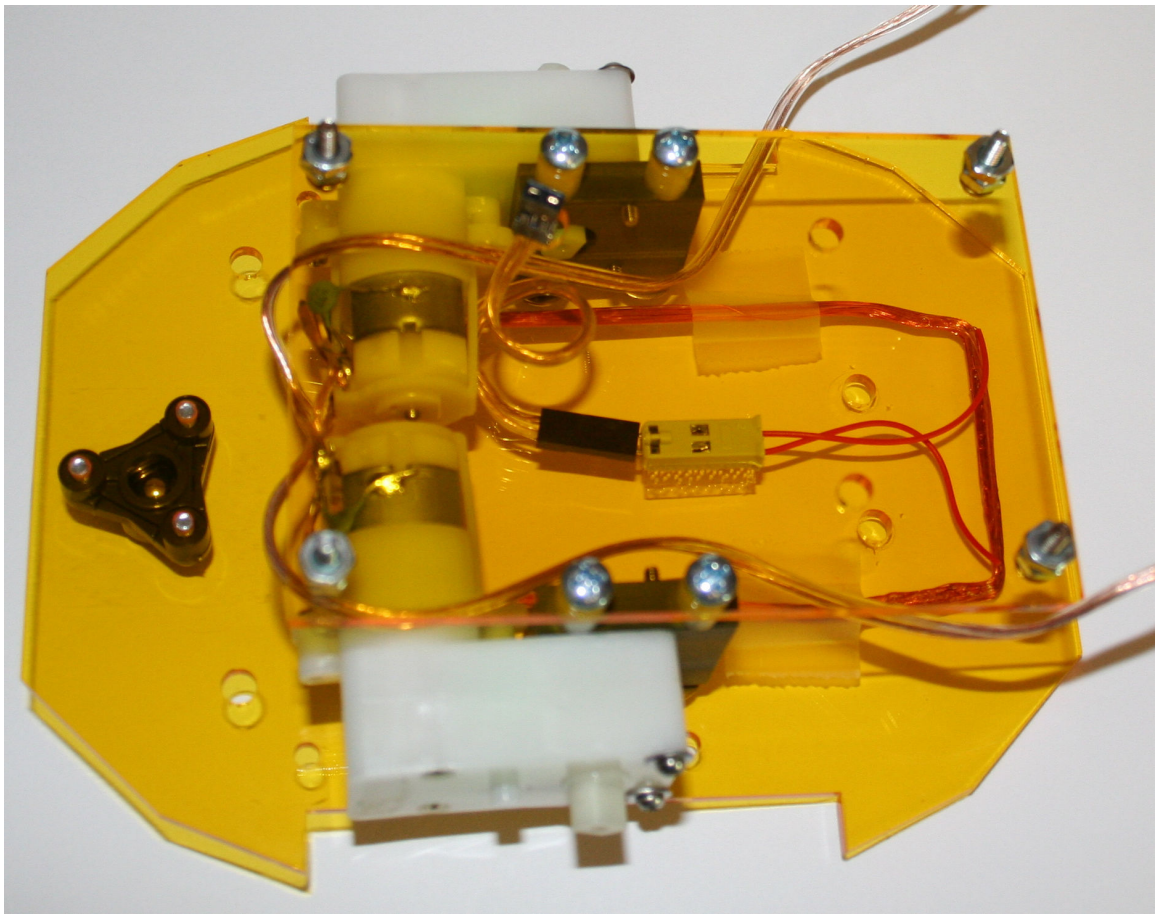
Step#34, Attach Controller Board Standoffs:



Figure#34, Attach controller board standoffs.

In step#34 place the #6 nylon standoff spacers on top of each GM8 motor mount.

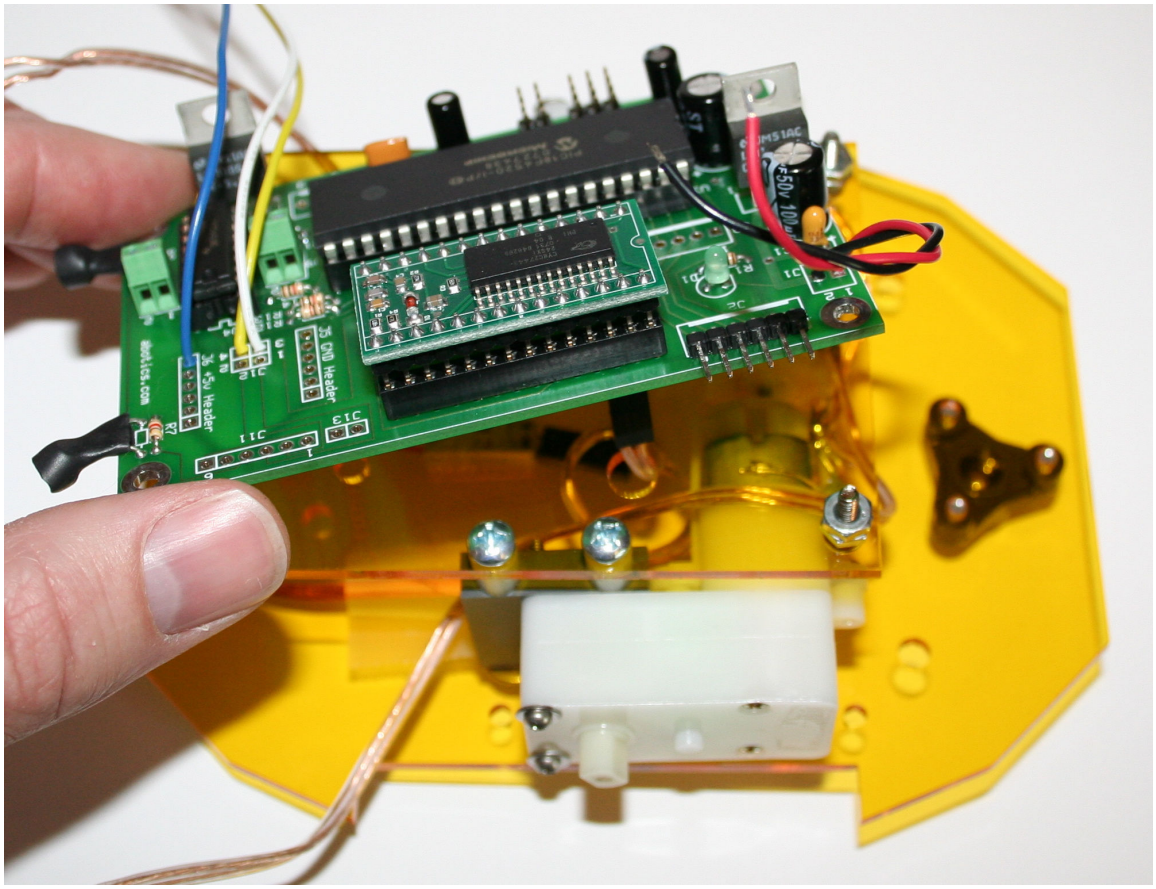
Step#35, Mount Controller Deck:



Figure#35, Mount Controller deck.

Mount the controller deck and secure using (4) #6-32x5/8” machine screws.

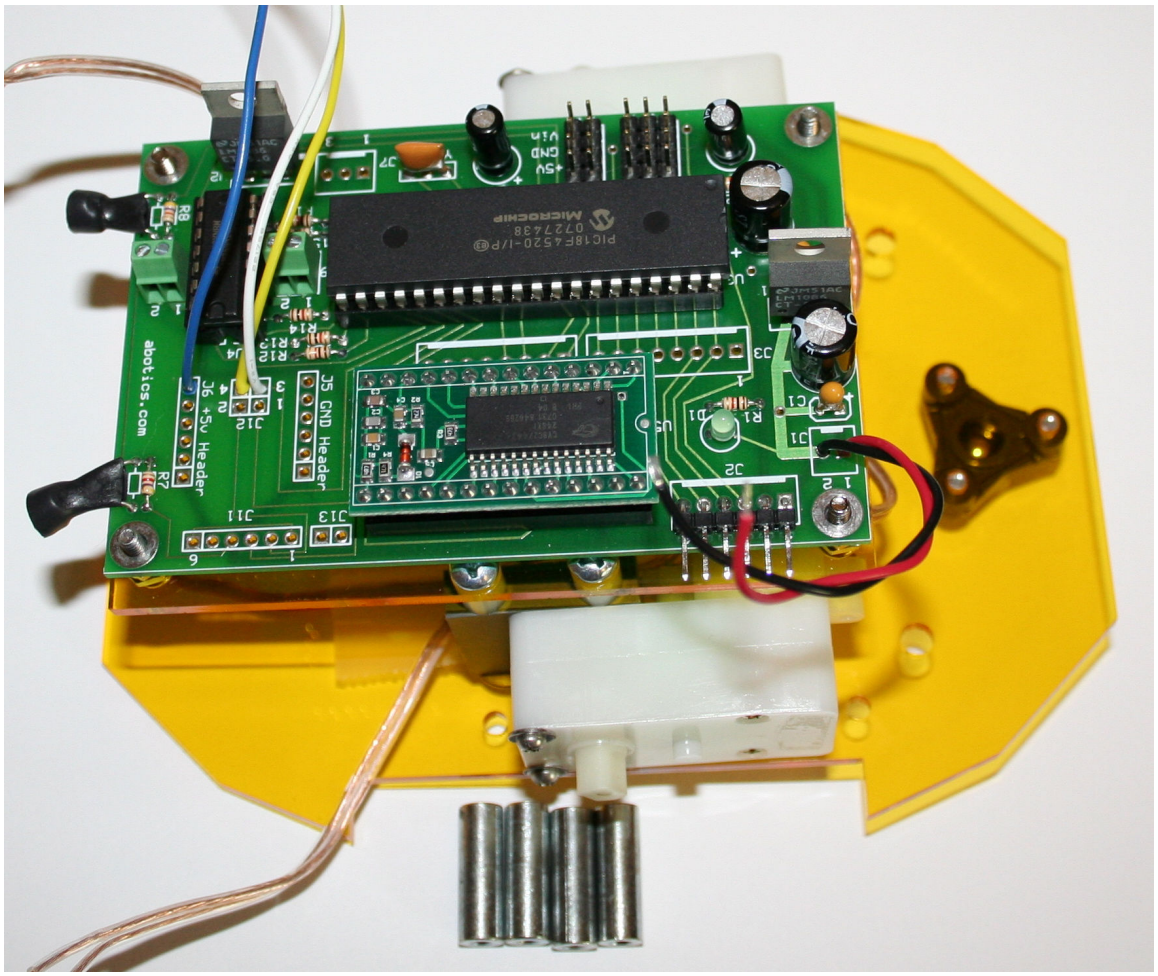
Step#36, Mount Controller Board & Connect RFID Cable:



Figure#36, Connect RFID cable to J8 on Controller Board.

In step#36 connect the RFID cable to J8 on the Controller Board and then align the controller board with the (4) #4-40 machine screws.

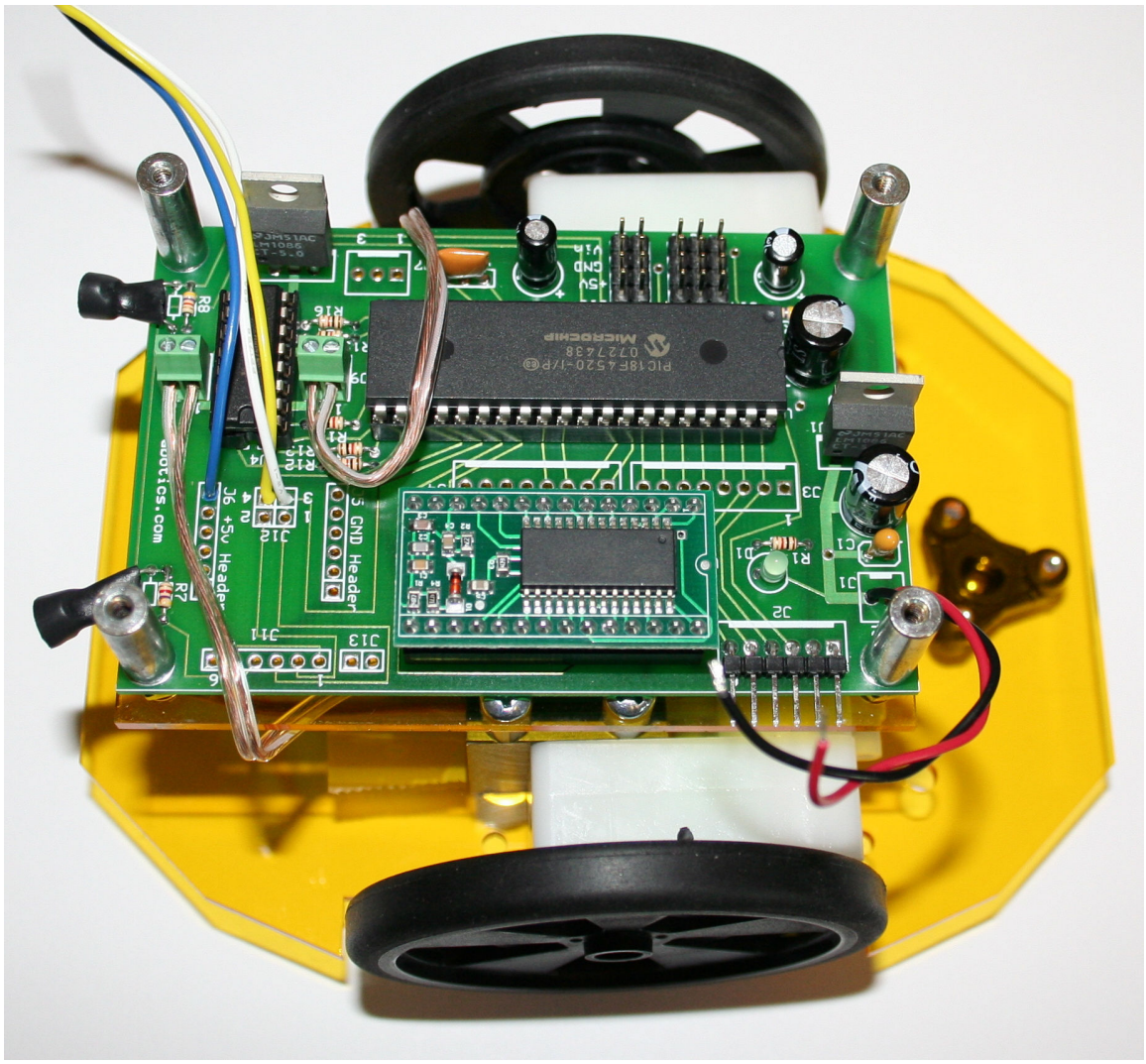
Step#37, Attach MatchPort/XBee Deck Standoffs:



Figure#37, Prepare to attach WW02 Wheel Encoders.

In step#37 thread a 0.75” long standoff onto each of the #4-40 machine screws. This will secure the controller board and allow us to mount the MatchPort/XBee deck later.

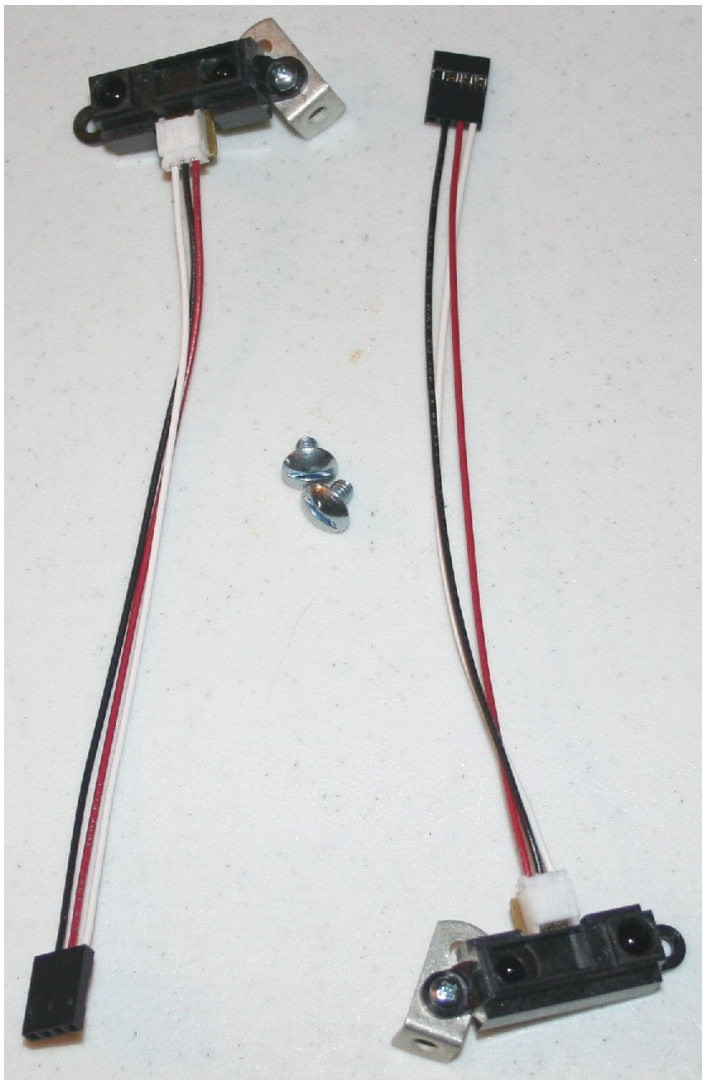
Step#38, Attach GM8 Wheels:



Figure#38, Attach GM8 Wheels.

Attach both the left and right GM8 wheels. Gently press them onto the GM8 motor output shaft

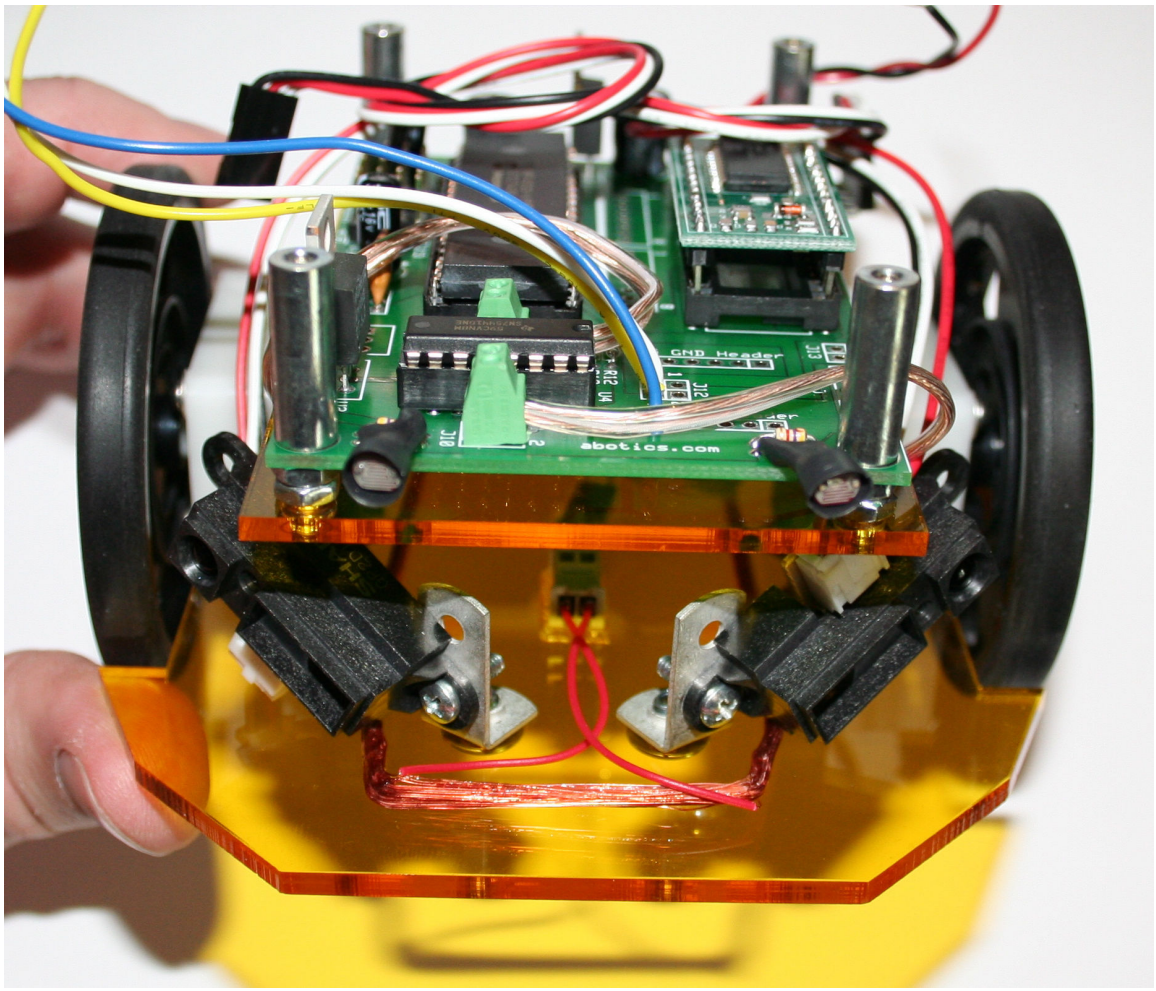
Step#39, Mount GP2D120 Sensors to Brackets:



Figure#39, Mount GP2D120 sensors to brackets.

Mount the GP2D120 sensors to the angle brackets using (2) #4-40x3/8" long machine screws. Try to mount the sensors at a 45-degree angle. Attach the GP2D120 sensor cable by aligning the small white JST 3-pin connector and then firmly press into place.

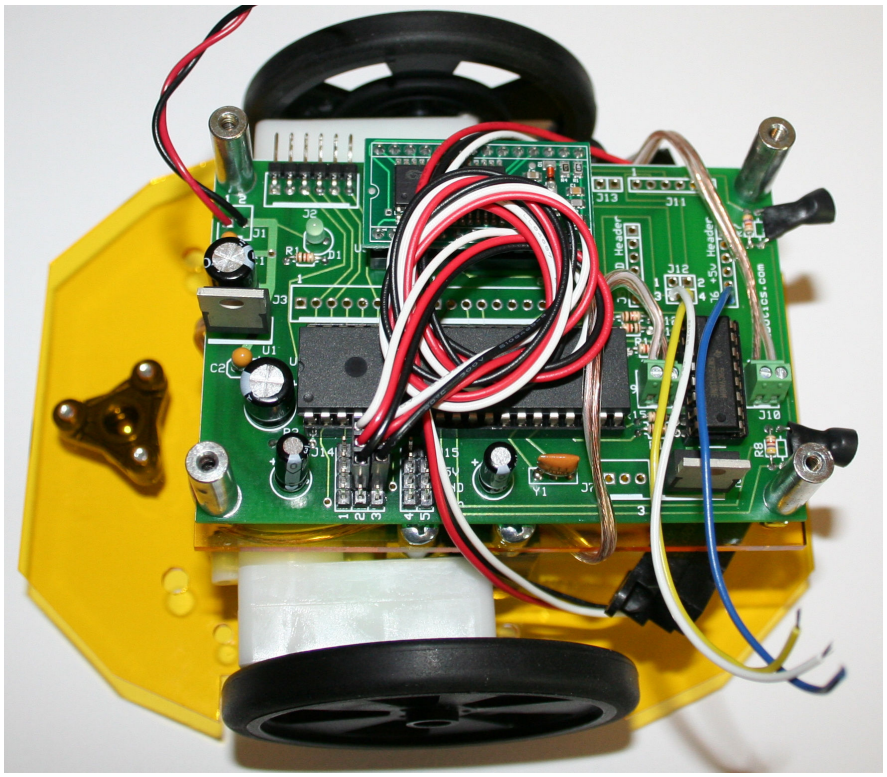
Step#40, Mount GP2D120 Sensors to Robot:



Figure#40, Mount GP2D120 sensor brackets to robot base plate.

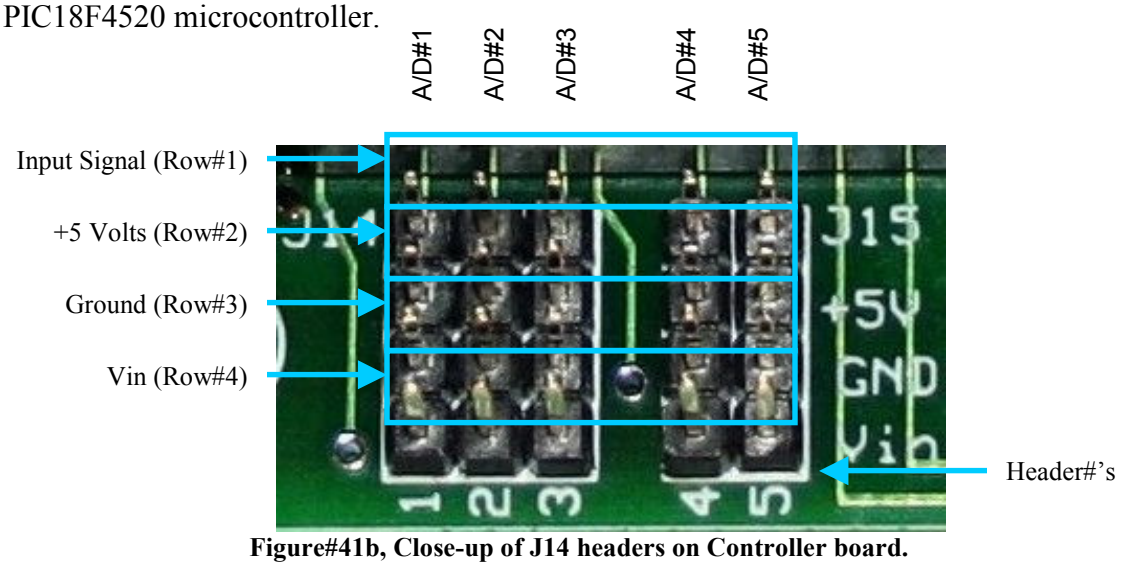
Mount the GP2D120 sensor brackets to the robot base using (2) #8-32x1/4" long truss head screws. You can adjust the sensors to look in whatever direction you want. You will need to bend the sensor wires close to the white JST 3-pin sensor connector so that the brackets can be bolted to the base plate. Please note that you may have to slightly bend the RFID antenna out on each side so that there is enough clearance for the GP2D120 mounts.

Step#41, Connect GP2D120 Sensors to the Controller Board:



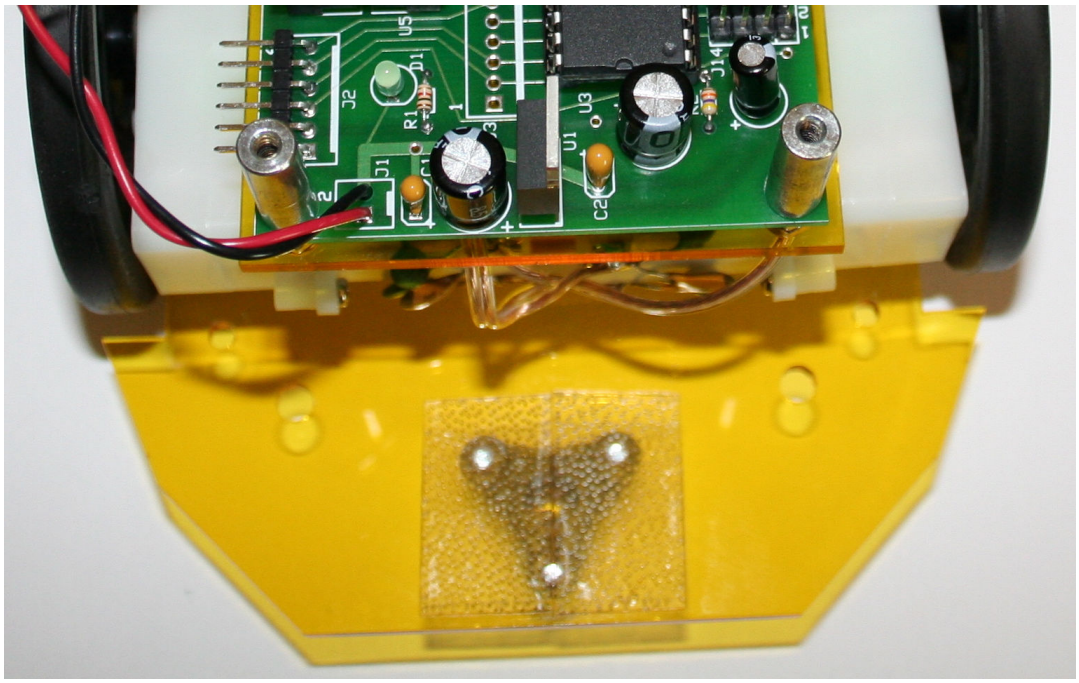
Figure#41a, Connect GP2D120 sensors to the controller board.

In step#41 connect the GP2D120 sensor cables to the controller board. The left cable must connect to J14, header#2, input signal row pin A/D#2 and the right cable connects to J14, header#3, input signal row pin A/D#3. Be sure that the red wire connects to the +5 Volts row and the black wire connects to the ground row. The white wire is the signal from the GP2D120 and connects to the input signal pin, which is closest to the PIC18F4520 microcontroller.



Figure#41b, Close-up of J14 headers on Controller board.

Step#42, Attach Dual Lock Tape to Base and Battery Holder:

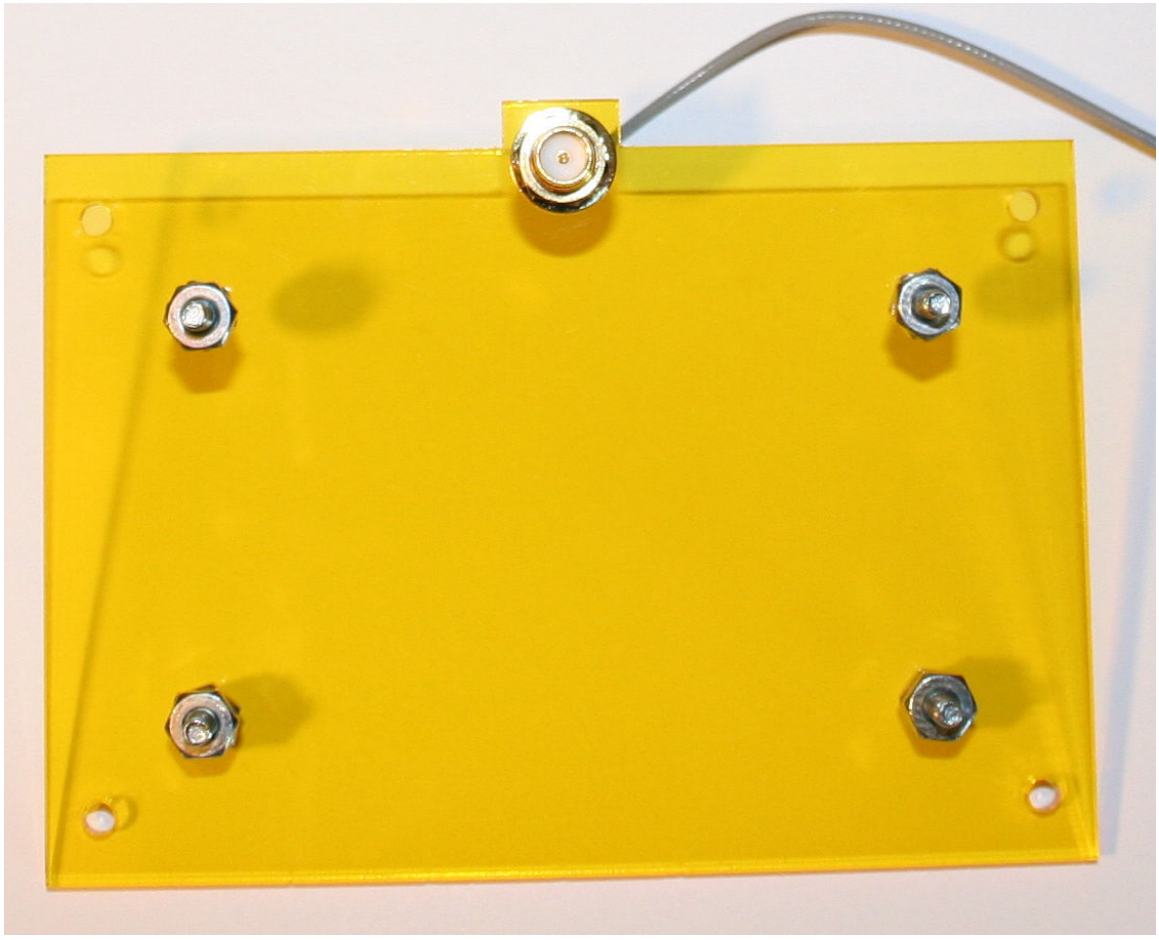


Figure#42a, Attach Dual Lock tape to the base plate.

Attach (2) 1" long pieces of Dual Lock tape to the robot's base plate. Leave the pieces of tape approximately 1/8"-1/4" in from the back edge of the base plate. Then apply (2) 1" long pieces to the bottom of the battery holder.

Figure#42b, Attach Dual Lock tape to the base of battery pack.

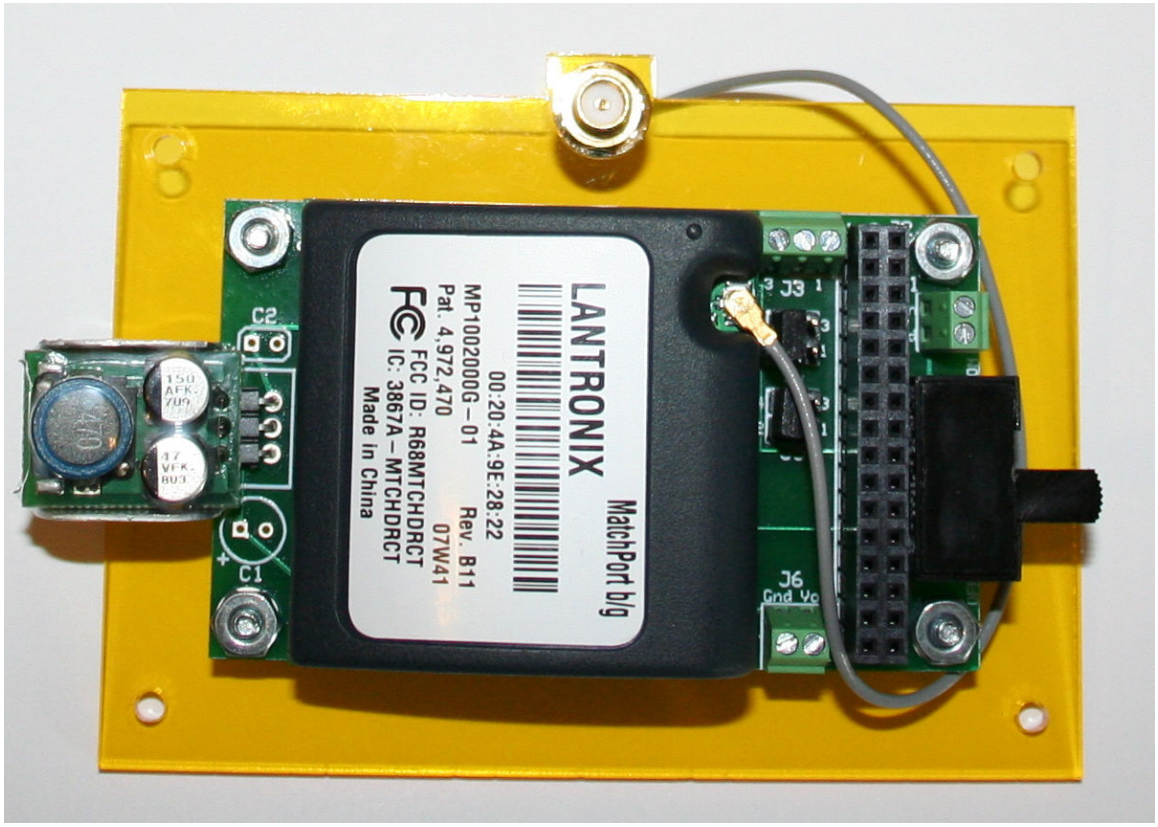
Step#43, Prepare MatchPort/XBee PCB Deck:



Figure#43, Prepare MatchPort/XBee PCB Deck.

In figure#43 prepare the MatchPort/XBee PCB deck by attaching (4) #4-40 machine screws and use (2) #4-40 nuts on each screw so that the MatchPort/XBee PCB has enough clearance. *Also, if you are using the MatchPort b/g module then attach the MatchPort b/g module antenna cable.*

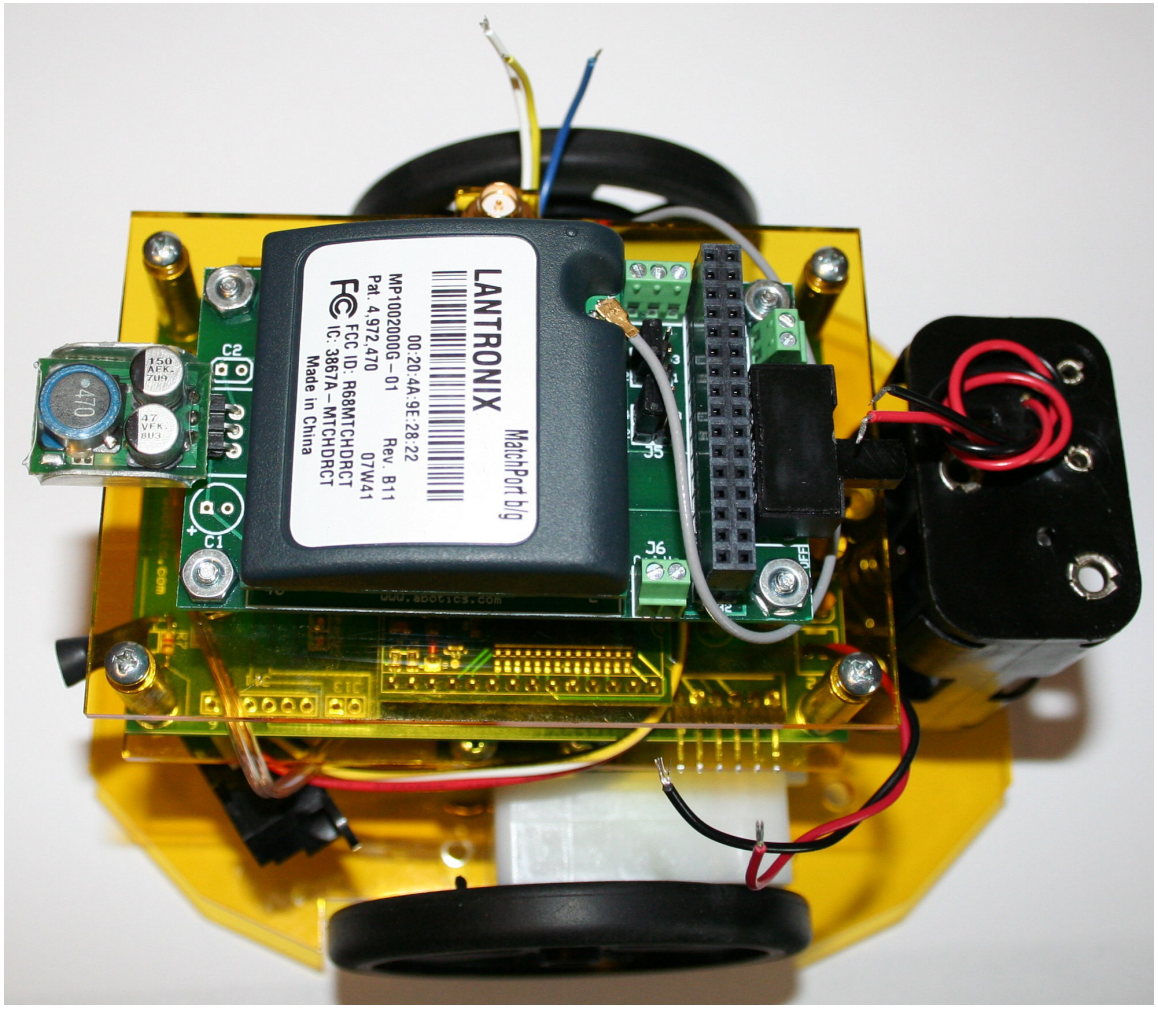
Step#44, Mount the MatchPort/XBee PCB to the Deck:



Figure#44, Mount MatchPort/XBee PCB to Deck.

Mount the MatchPort/XBee PCB to the deck and secure using (4) #4-40 nuts. Connect the antenna cable to the MacthPort b/g module if you are using the MatchPort b/g. We have decided to show you a MatchPort/XBee PCB with a MatchPort b/g module installed to reduce the number images. It should be noted that you might be using the XBee ZigBee module. From this point on we will only show images with the MatchPort b/g module installed. XBEE users can simply disregard the MatchPort b/g specific steps.

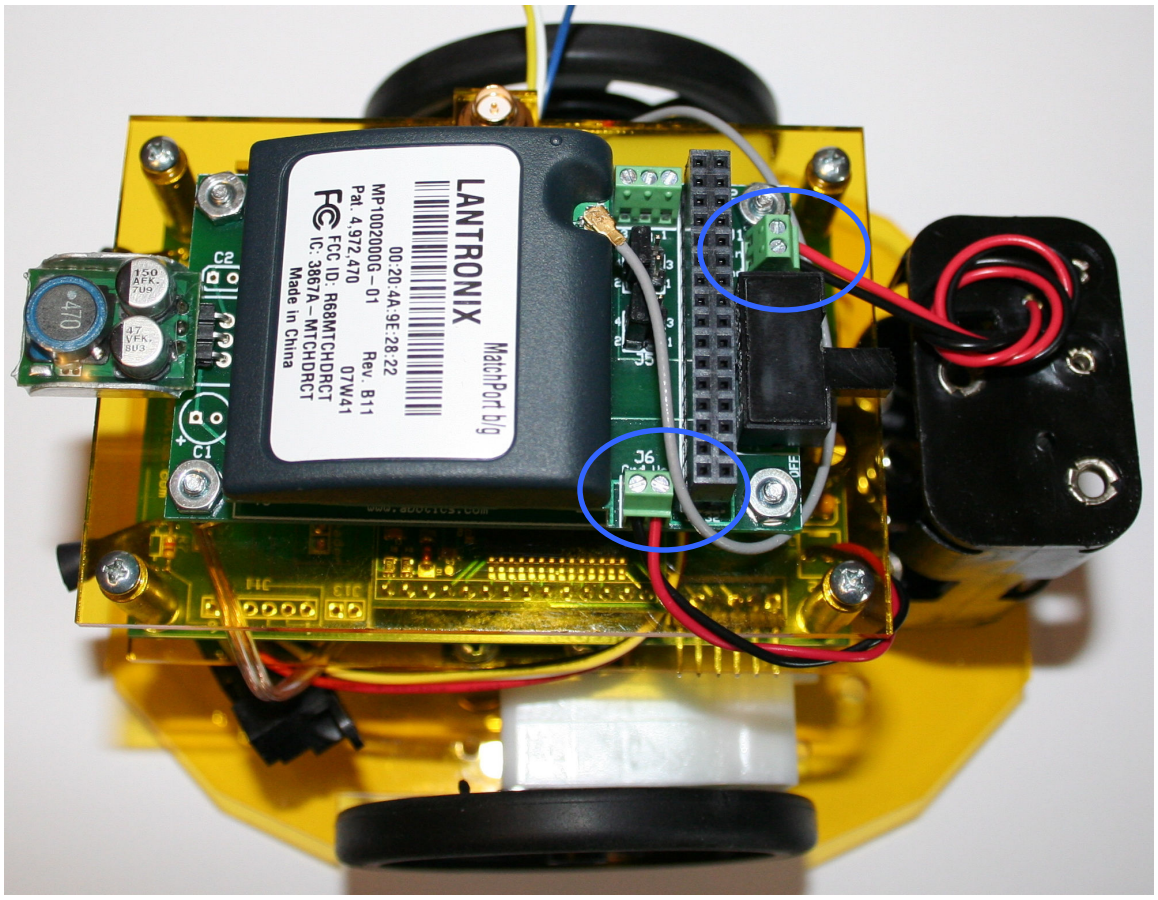
Step#45, Mount MatchPort/XBee Deck to Robot:



Figure#45, Mount MatchPort/XBee Deck to Robot.

Mount the assembled MatchPort/XBee deck to the (4) standoffs and secure with (4) #4-40 machine screws.

Step#46, Connect Power Wires:



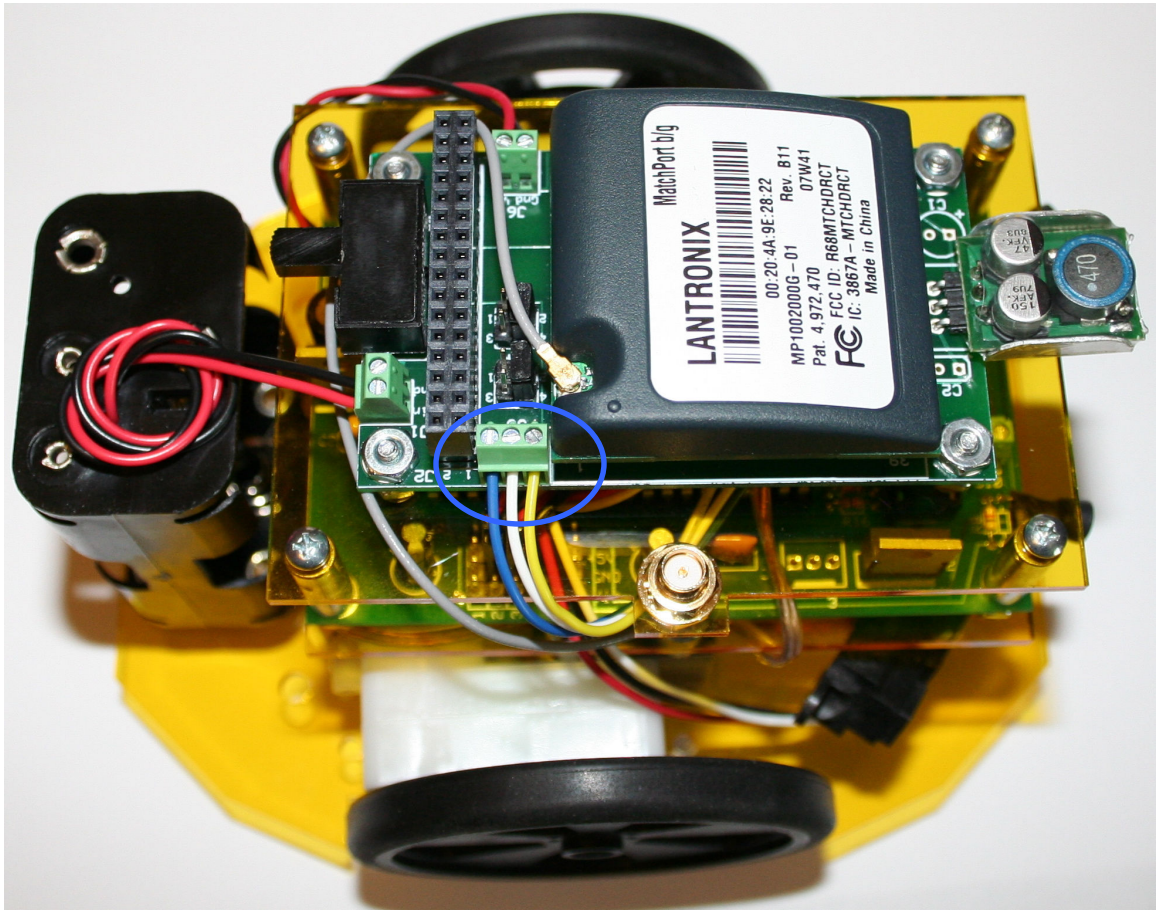
Figure#46, Connect Power Wires.

Connect the (6)-AA battery pack wires to J1 on the MatchPort/XBee PCB. Connect the J1 Controller board power wires to J6 on the MatchPort/XBee PCB. Connect each of the black wires to ground, Gnd. Please look at the connection tables below. Improper connection can result in damage to the Controller Board and/or MatchPort/XBee PCB and/or MatchPort b/g module.

MatchPort/XBee PCB	Purpose
J1, Vin pin	Positive Battery Pack Red Wire
J1, Gnd pin	Ground Batter Pack Black Wire

MatchPort/XBee PCB	OPEN-ROBOT PIC18F4520 Board
J6, Vo pin	J1, pin#1 Red Wire
J6, Gnd pin	J1, pin#2 Black Wire

Step#47, Connect PIC18F4520 Serial Port Wires:

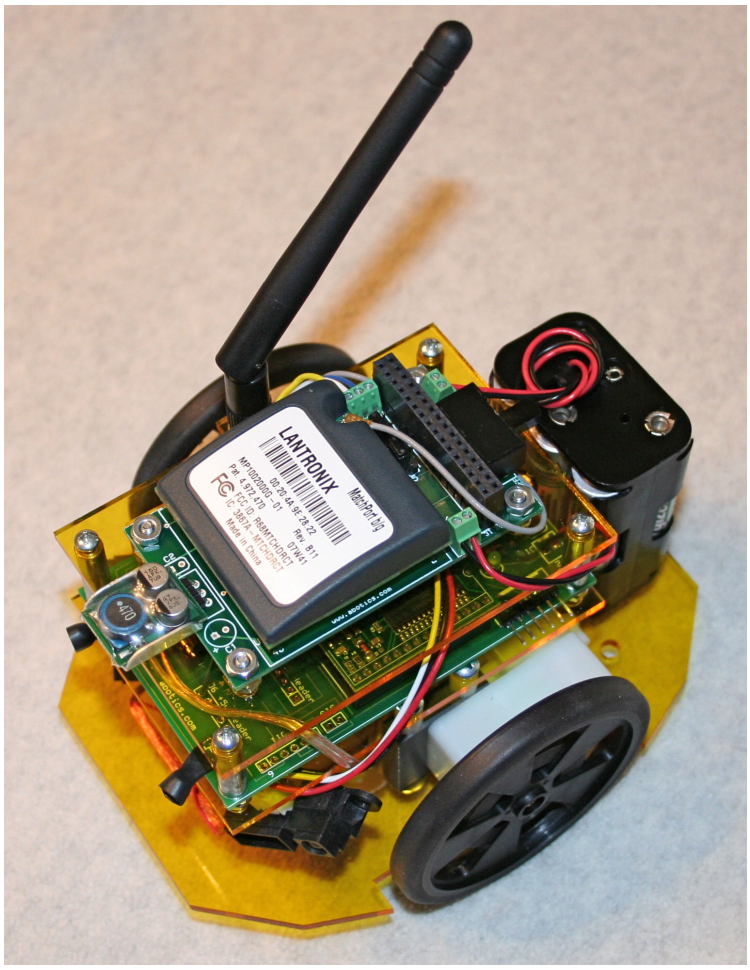


Figure#47,Connect PIC18F4520 Serial Port Wires to MatchPort/XBee PCB.

Connect the controller board PIC18F4520 serial port wires to J3 on the MatchPort/XBee PCB. The blue wire connects to J3 pin#1, the white wire to J3 pin#2, and the yellow wire to J3 pin#3. Please look at the connection table below. Improper connection can result in damage to the Controller Board and/or MatchPort/XBee PCB and/or MatchPort b/g module.

OPEN-ROBOT PIC18F4520 Board	MatchPort/XBee PCB
J6, +5 volts header, blue wire	J3, pin#1
J12, pin#3, white wire	J3, pin#2
J12, pin#4, yellow wire	J3, pin#3

Step#48, Attach MatchPort b/g Antenna (purchase separately):



Figure#48,Attach MatchPort b/g module's rubber antenna.

Finally attach the MatchPort b/g module's rubber antenna. If you are using the XBee module simply disregard this step. Congratulations because you know have a complete OPEN-ROBOT!

If you are using the MatchPort b/g module then read the following to get started with your robot.

http://www.abotics.com/OPEN_ROBOT_DOCS/OPEN_ROBOT_Getting_Started_MatchPort.pdf

If using the XBEE ZigBee module then read the following to get started.

http://www.abotics.com/OPEN_ROBOT_DOCS/OPEN_ROBOT_Getting_Started_XBee.pdf

If you have any questions or assembly issues please contact abe@abotics.com