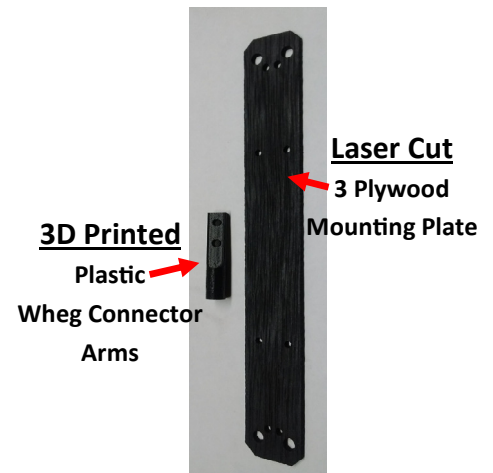
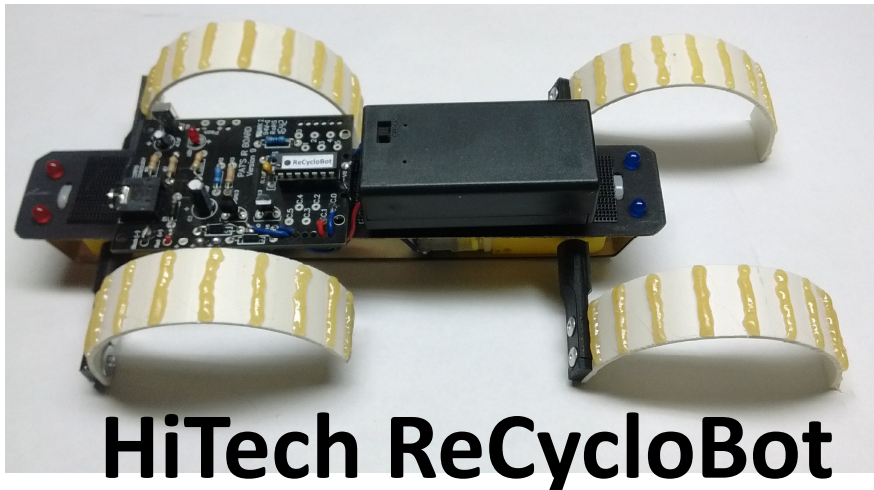


How to Build Pat's HiTech ReCycloBot

Pat McMahon– V6– 6/4/2018

Design Brief– Using Recycled PVC and Aluminium off cuts, construct your own Infrared Controlled 14M2 Picaxe ReCycloBot with Whlegs (not ~~W~~heels/~~L~~egs). This HiTech version uses a Laser Cutter (using Pat's dxf.files) for the top 3plywood mounting plate and a 3D Printer (using Pat's stl.files) for the Whleg Connectors.

Note– The photos taken in this “How to Build” are using Recycled & new parts. The same can be done using all new materials & parts. If you don't have access to a 3D Printer and Laser Cutter, use Pat's basic ReCycloBot, drilling by hand and using Aluminium Connecting Arms.

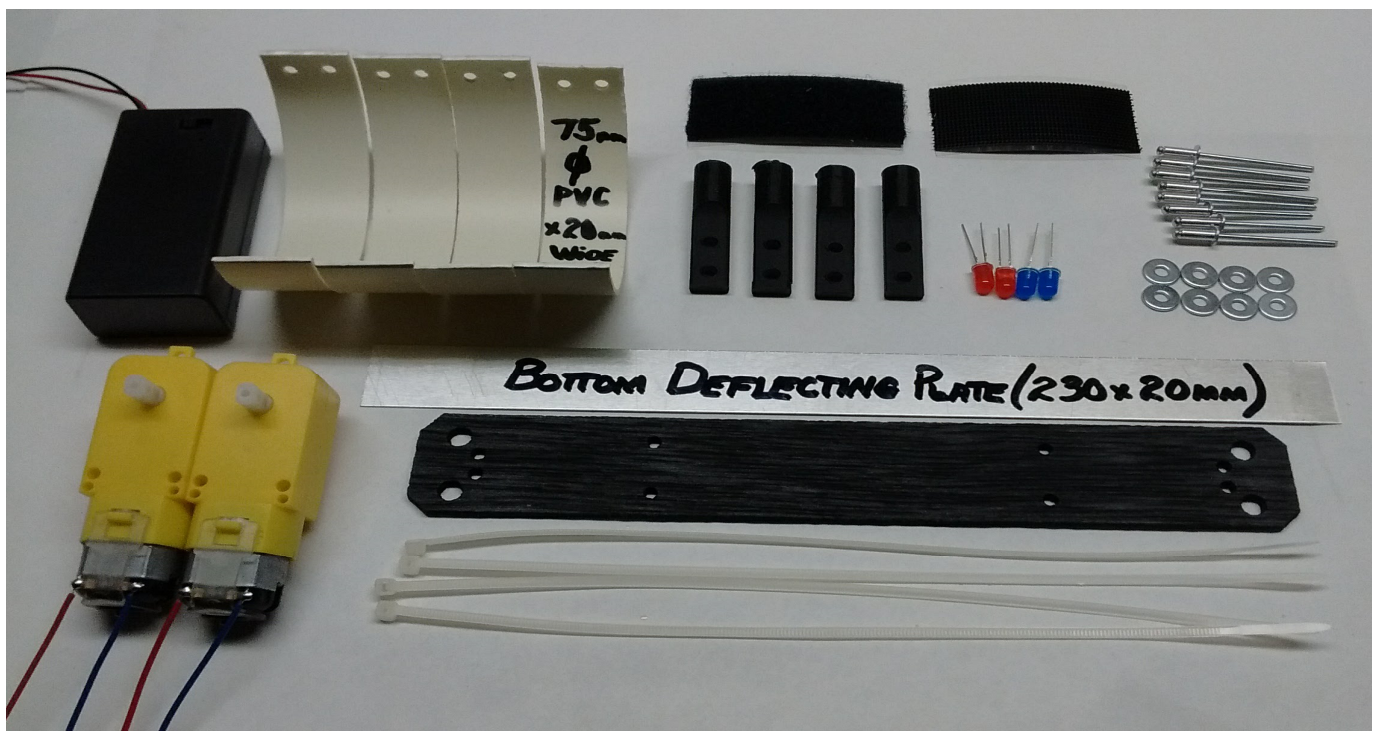


HiTech ReCycloBot

Below are some of the Production Steps, or you can use your own design. Tick off each box as you complete a task and Document it.

Tools Required– Soldering Iron, Pop Rivet Gun, Small Zip Ties, Small Phillips Head Screwdriver, Hot Glue Gun, Drills, Velcro Tape.

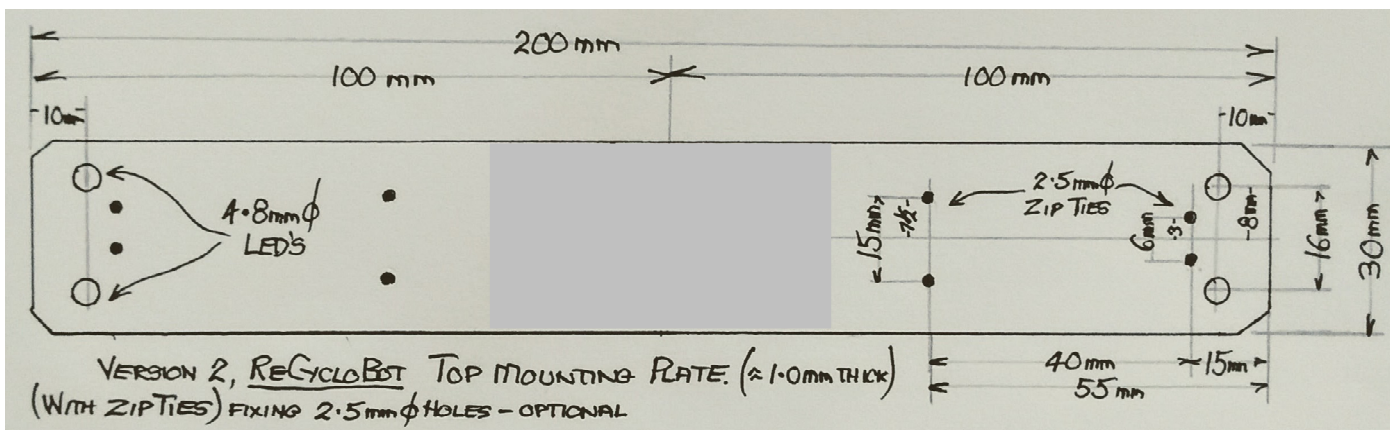
Below are the main parts required to construct your HiTech ReCycloBot propelled by Whlegs, used by the European Space Agency.



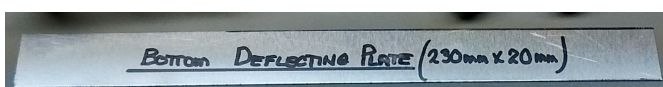
Materials List -

- 4 x 75mm Diameter 1/2 PVC DownPipe x 20mm wide.
- 2 x Motor & Gearbox (ratio 1 : 48)
- 1 x 9V Switched Battery Pack
- 4 x Coloured pair 5mm LED's.
- 100mm of 25mm wide Velcro Tape.
- 4 x 43mm long x 10mm Diameter Whleg Connecting Arms(3D Printed)
- 1 x 200mm x 30mm wide 3mm Plywood thick (Laser Cut) Top Mounting Plate.
- 1 x 230mm x 20mm wide x 0.6mm thick Bottom Deflecting Plate.
- 8 x 4.3 Pop Rivets & 8 x 1/8" (3.2mm) small flat washers.
- 1 x 14M2 Picaxe Infrared 14M2 Microcontroller & 9V Battery.
- 4x White (200mmx2.5mm) Zip Ties.

- Detailed Dimensions for the Top Mounting Plate (with optional Motor fixing method using 4 x 2.5 mm Zip Ties)**
Note—Optional small Zip Tie Motor Fixing holes are coloured in black, not needed if fixing with hot glue gun.



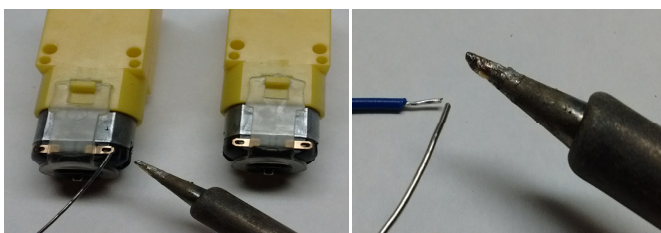
- Construct 1 Aluminium Bottom Deflecting Plate**
(230mm x 20mm x ~0.6mm thick)



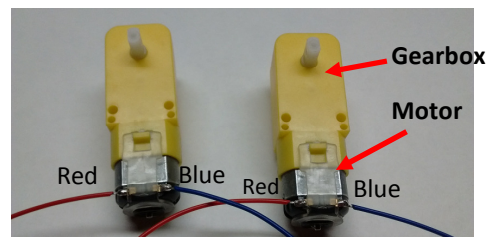
- If not using 3D printed Arms, drill 2mm Diam holes, 5mm in from both ends on both ends of the Motor Shafts,.**



- Carefully align & Pre Tin the Motor tabs and Wire**



- Solder the ~100mm Red (+) to the left tab & the Blue (-) Wires to the right tab of the Motors, as viewed.**



- 3D Print 4 x Wheg Connecting Arms**

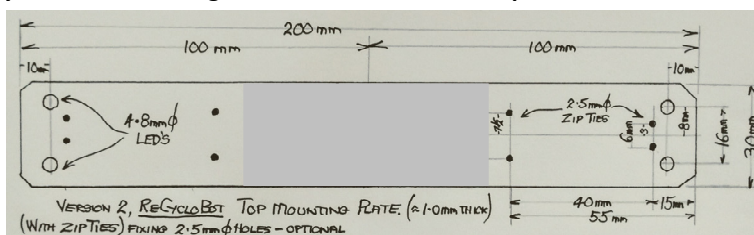
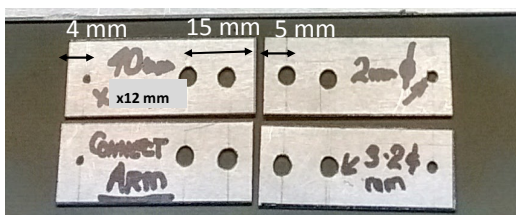


- Using a Laser Cutter, cut the Top Mounting Plate.**



(Or cut 40mm x 12mm x ~1 mm thick) Drill holes centrally

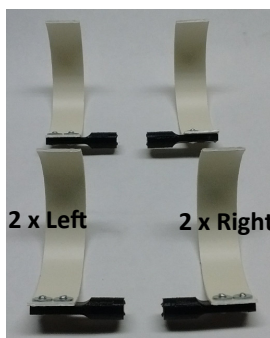
or drill using the drill sizes for holes required as below



- Cut 20 mm wide Rings from the 75mm Diam PVC Down Pipe, then cut exactly in half.**



- IMPORTANT- Drill 3.5mm Diam holes in the PVC & fix using 4.3 Pop Rivets. Ensure the Connecting Arm are at 90 degrees to the Wheg.**



IMPORTANT- Build 2 identical left & 2 identical right facing Whegs (part Wheel/legs). Make sure the white PVC is behind the black connector in all cases before riveting with washers, to stop splitting the 3D Printed Arm.

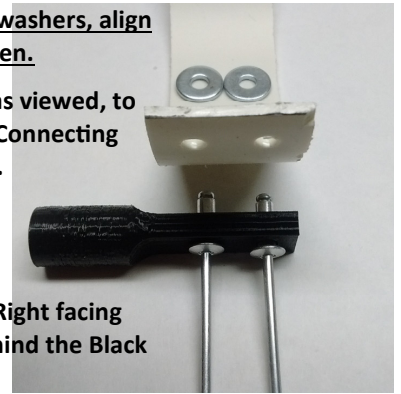
See detail steps next page.

- Using Connecting Arm as a Template, Carefully mark & drill two 3.5 mm holes. NOTE- Centrally, square & 10mm centres.



- Using 4.3 Pop Rivets & 3.2 mm flat washers, align first to get arm at 90 degrees & fasten.

Note- Carefully assemble & insert as viewed, to stop splitting the 3D printed Whег Connecting Arm, if honeycombed and not solid.

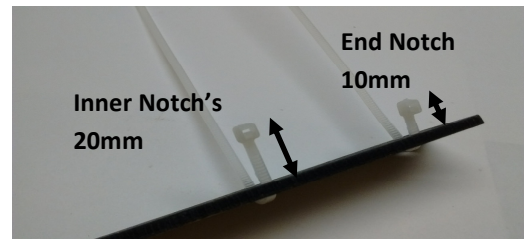


IMPORTANT- Make 2 Left and 2 Right facing Whегs, all with the White PVC behind the Black Arm with washers.

- If using Zip Tie method, use 4 x 200mm x 2.5 mm around the motor housing, insert from back as below.



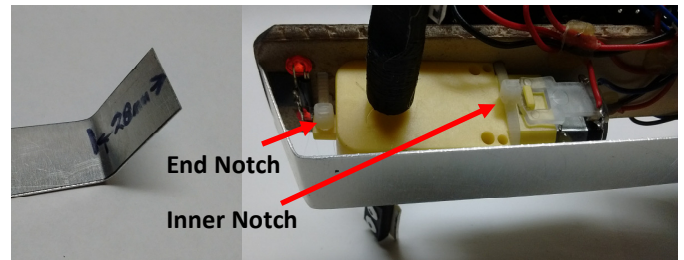
- Ensure the Zip Ties are flat on the top of the Top Mounting Plate, for later mounting of the battery & microcontroller by Velcrose tape, end notch's up 10mm, inner notch's up 20mm.



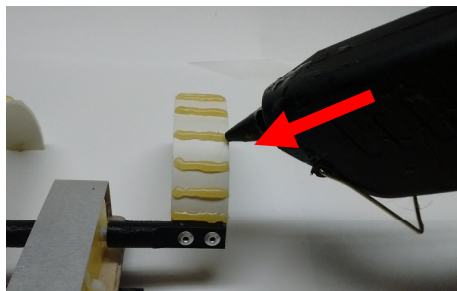
- Check the Zip Ties are flat on the top of the Top Mounting Plate, for later mounting of the battery & microcontroller by Velcrose tape, fix & lock Motors with both facing inwards to each other.



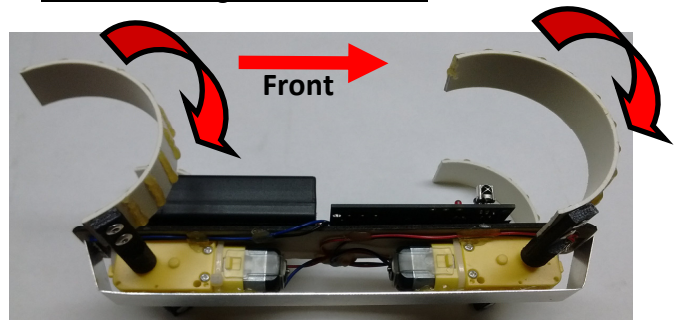
- Bend up one end of the Deflecting Plate ~28mm, fix with hot glue gun later, bending other end up to protect motors.



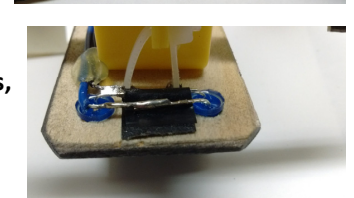
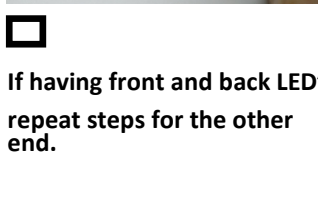
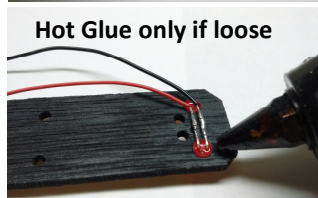
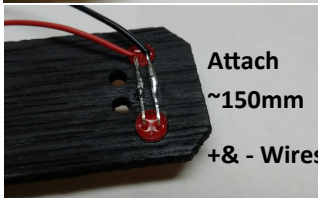
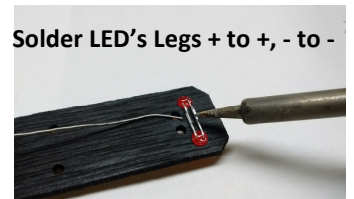
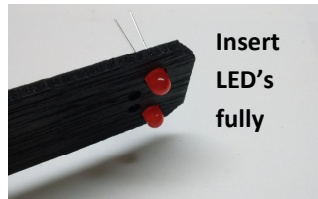
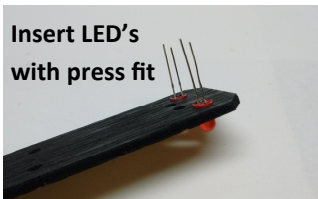
- Using a Hot Glue Gun, design your own grippers on the PVC Whегs, to stop slipping.



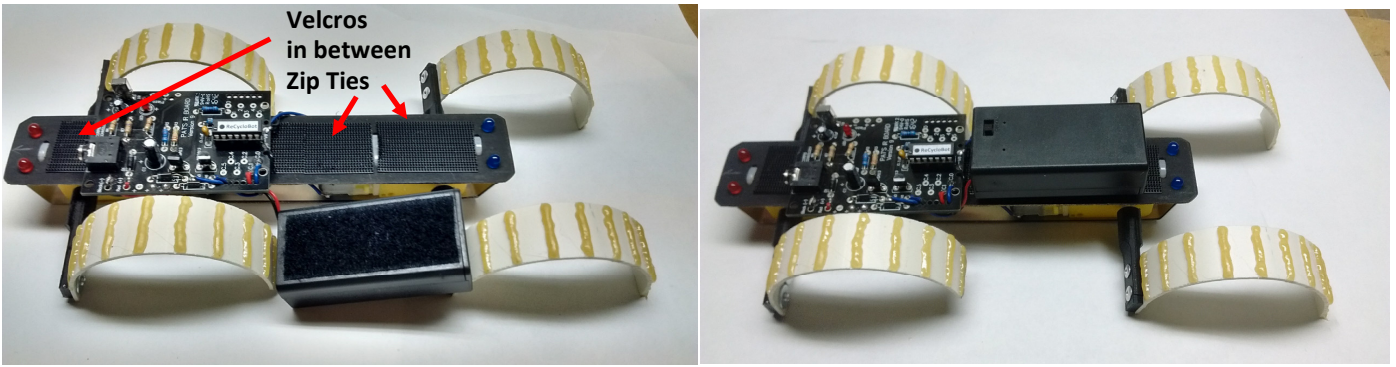
- IMPORTANT - Zip Tie Motors to top plate & Align carefully, centrally & 15mm in from ends. Then push on assembled Whег Connector Arms .



- Below are the steps if you are having LED's on the front & back of your ReCycloBot.

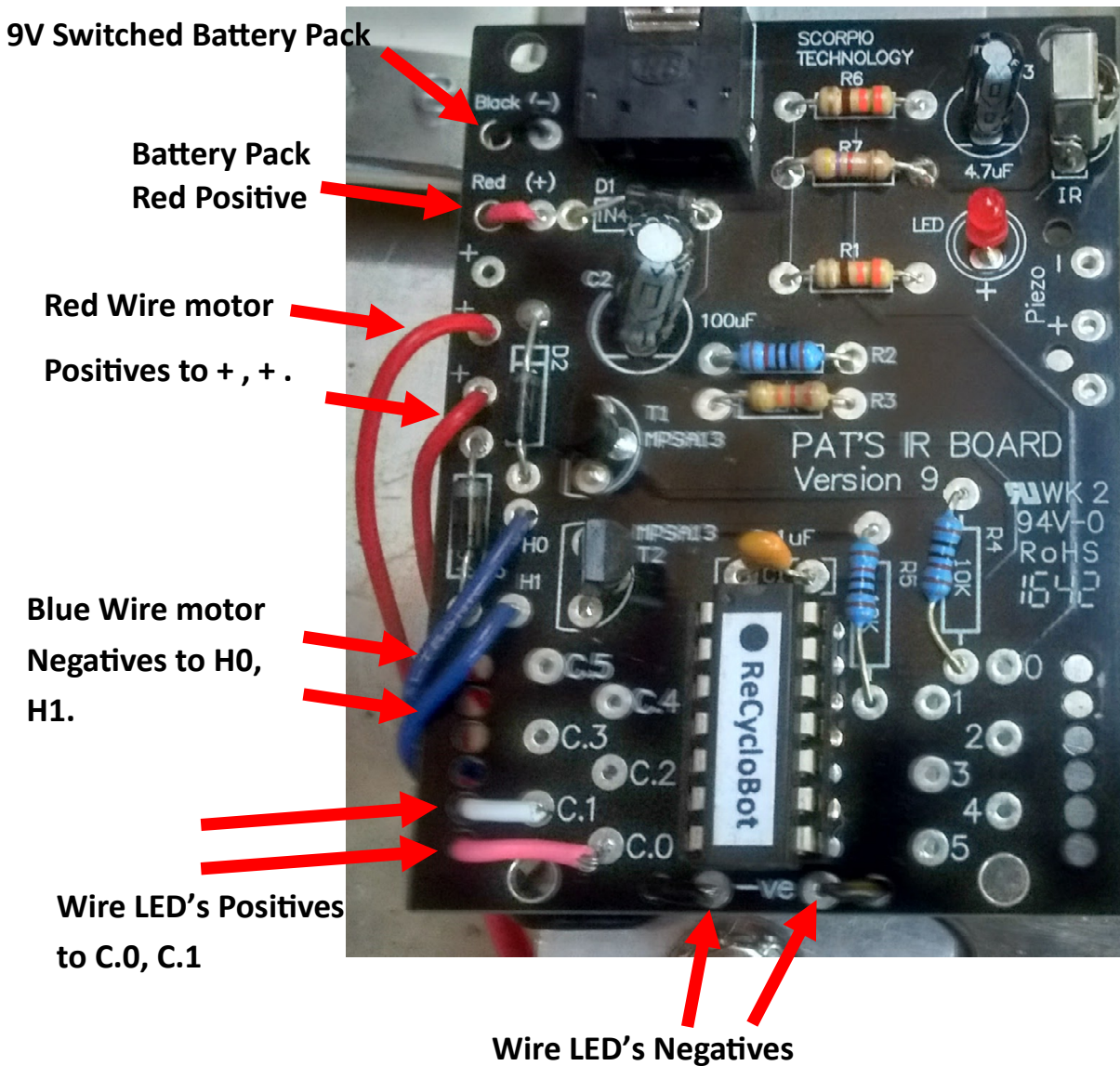


- ❑ Wire in the Motors, 4 LED's & mount the 9V switched battery pack with Velcros, for easy replacement later.



- ❑ Build Pat's 14M2 Motor Driver Microcontroller, attach to the Top Plate with velcros or double sided tape. Program your Infrared Controlled ReCycloBot using Pat's ReCycloBot Infrared Program.

How to Connect to your 14M2 Motor Driver Microcontroller



Note - If the Motors/Whegs are going in different directions, swap the Positive and Negative wires around on one motor only, at the motor.

Congratulations on Building & Coding your own Infrared ReCycloBot, Well Done!