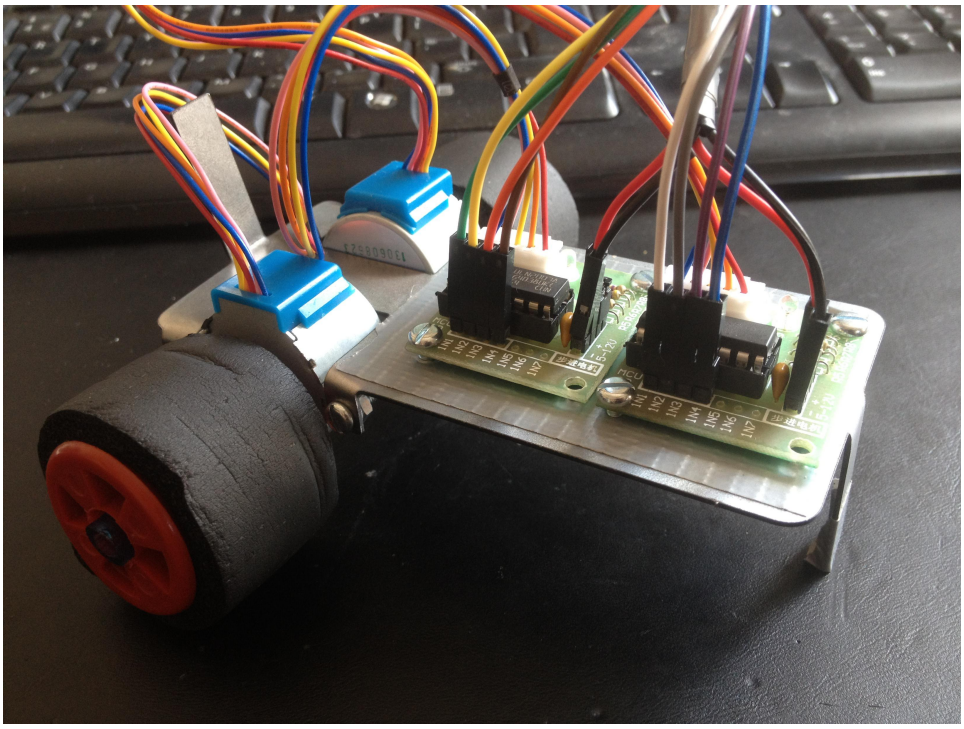
Raspberry Pi
Scratch Programmable Robot for £12

Beta Model



Basic equipment you will need

If you haven't got them already you will need some cheap basic Pi equipment.

Breadboard
Breadboard wires
Battery case and lead to hold 4 AA batteries
GPIO breakout board and ribbon cable, for example the Pi Cobbler
Gaffer tape
Insulation tape

All of these are easily obtainable from online retailers and reusable over many other Pi projects.

The software needed

Download and install the free Cymplecy scratch add-on code which will allow Scratch to talk to the GPIO pins on your Pi.

At your Pi copy or type in the following, please note this should be entered as one line.

sudo wget https://dl.dropbox.com/s/oql4qzm8jlnsbeb/install_scratch_gpio2.sh -O /boot/install_scratch_gpio2.sh

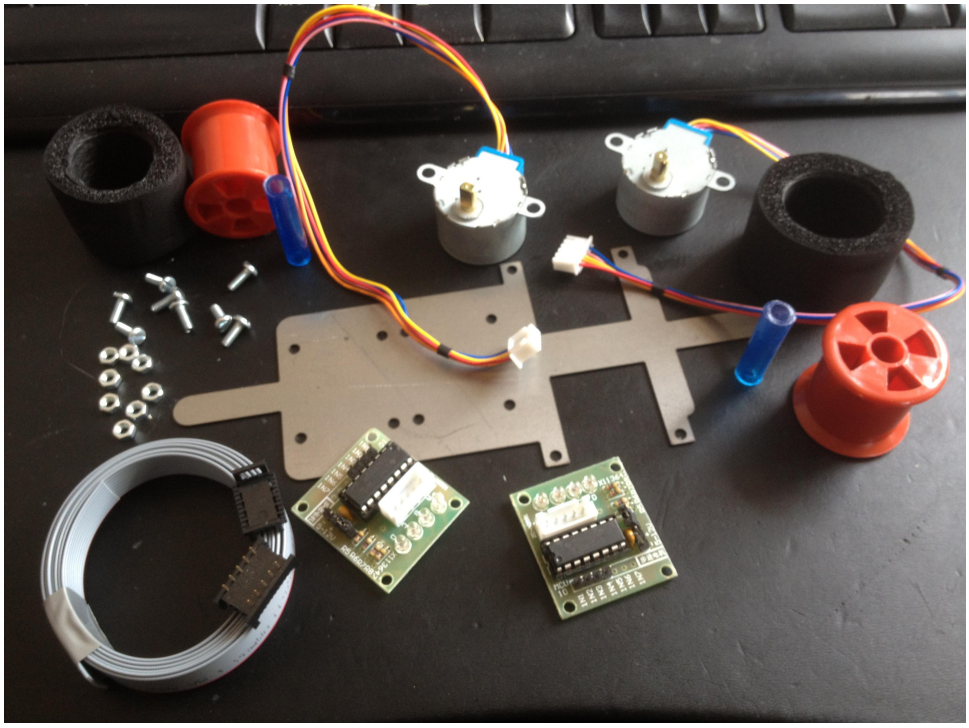
Then type

sudo /boot/install_scratch_gpio2.sh

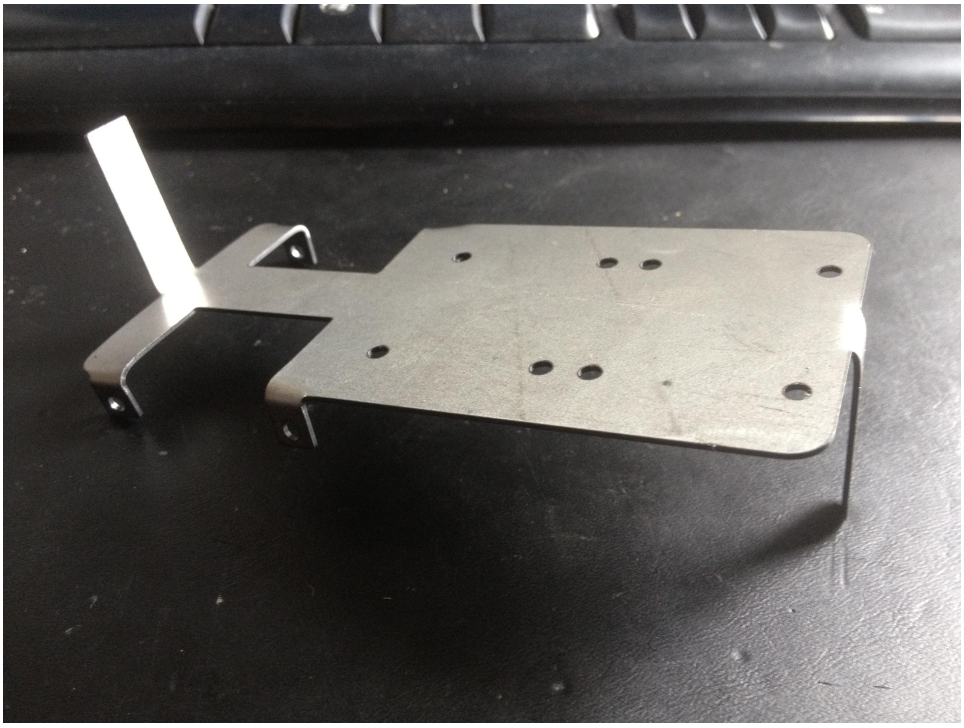
For more details please see http://cymplecy.wordpress.com/2013/04/22/scratch-gpio-version-2-introduction-for-beginners/

The Robot Body

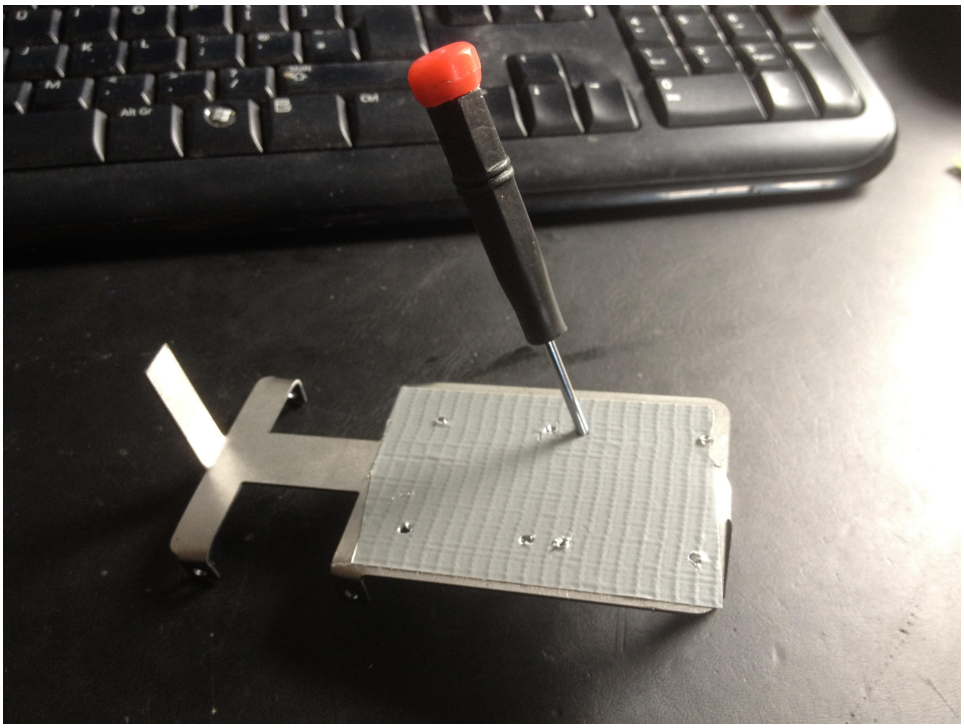
The kit



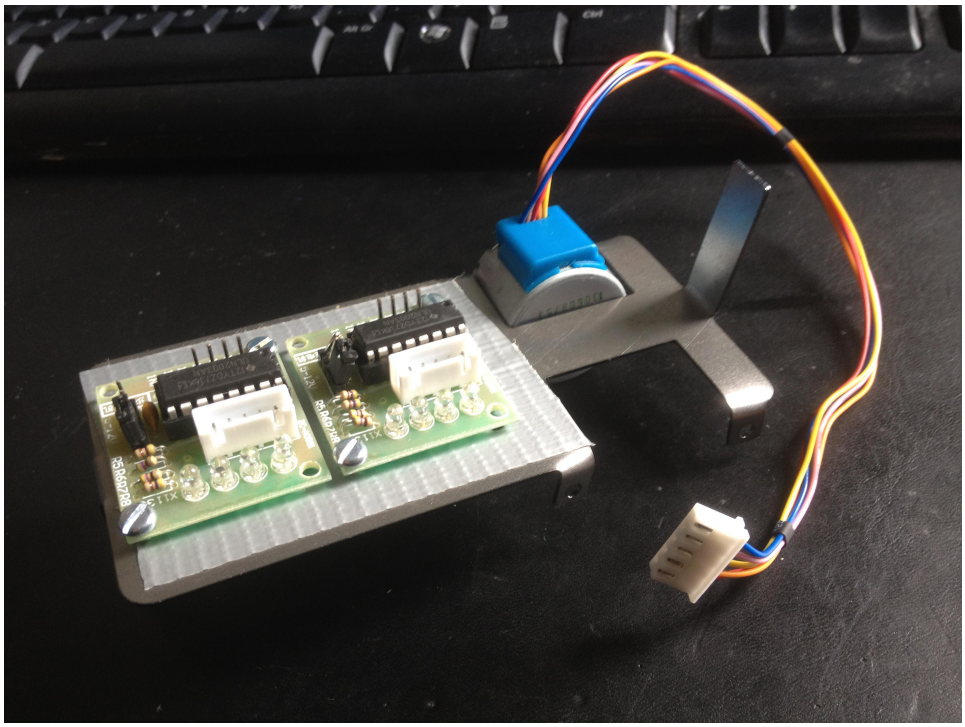
Using pliers bend the chassis plate to look like this

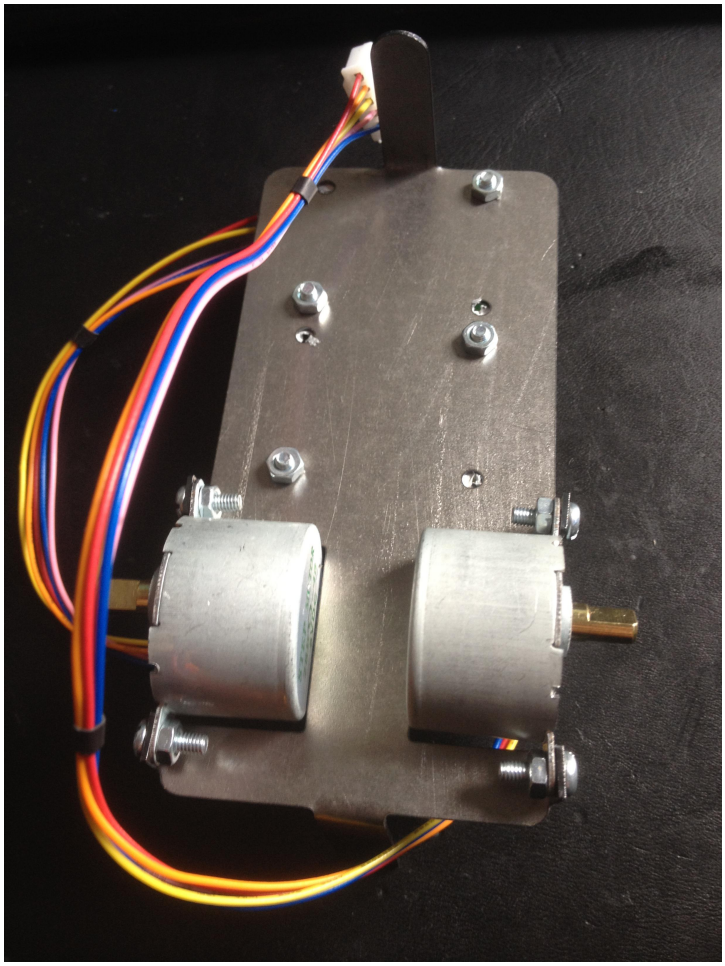


For electrical insulation stick a length of gaffer tape on the top and pierce holes in it using a small screwdriver

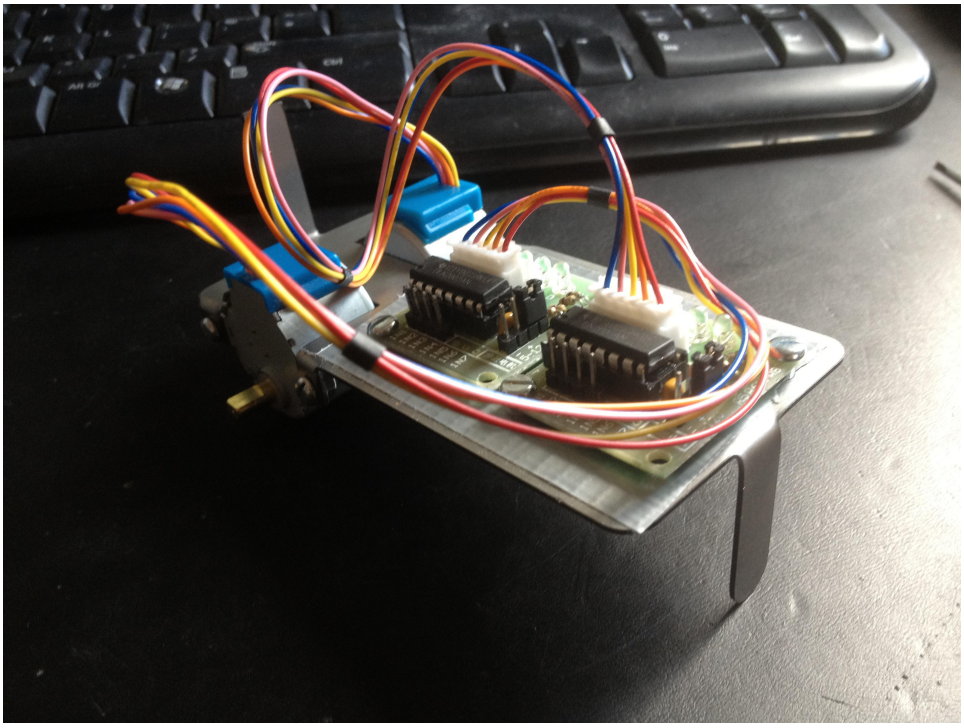


Using the screws provided attach stepper controller boards to the top and screw in the right hand stepper, then the left stepper

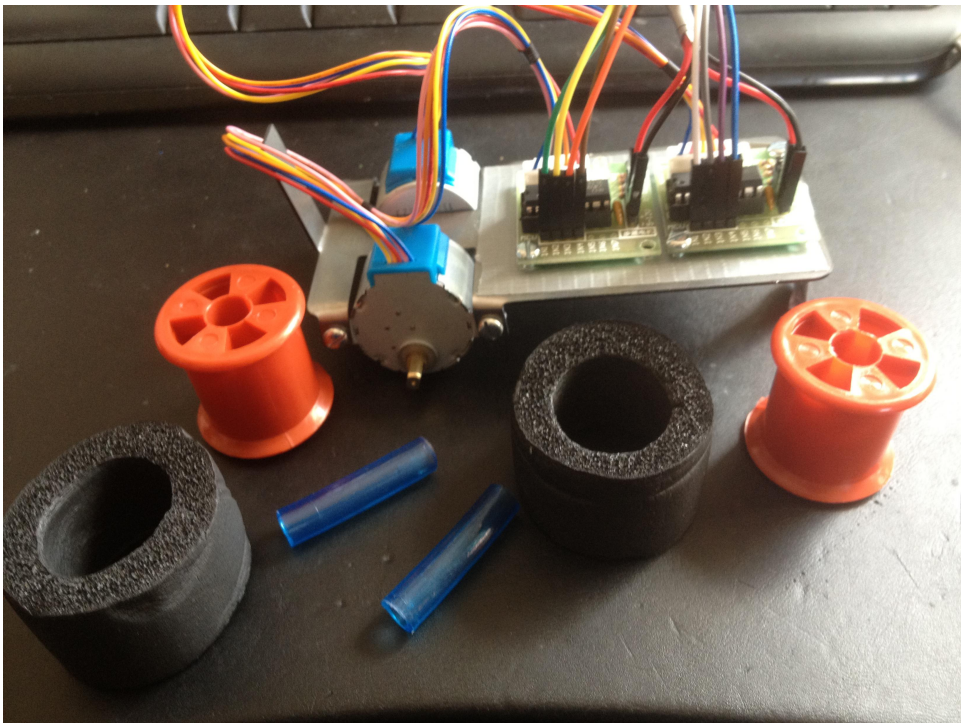




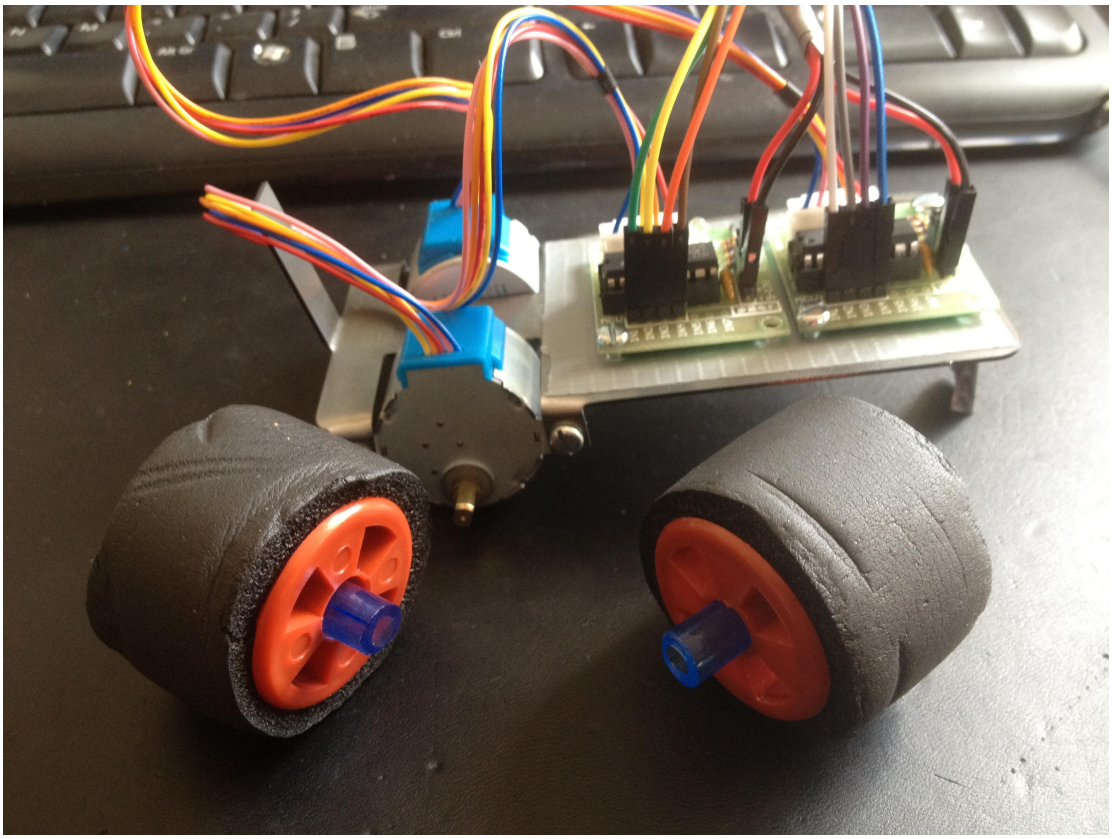
Attach the stepper motor wires to the controller boards



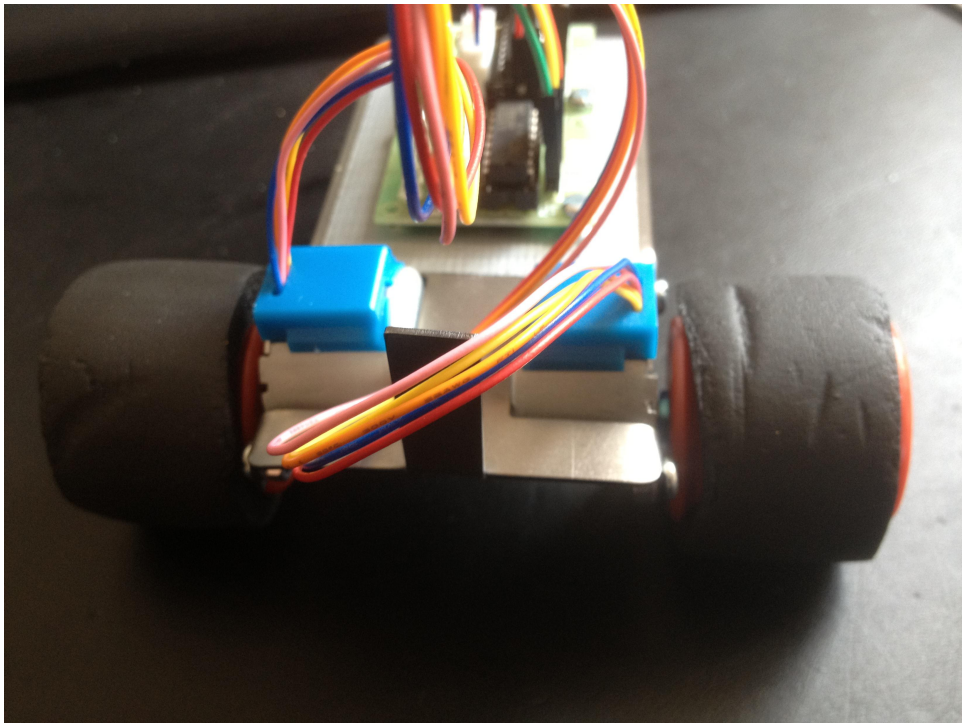
Take out the wheel equipment



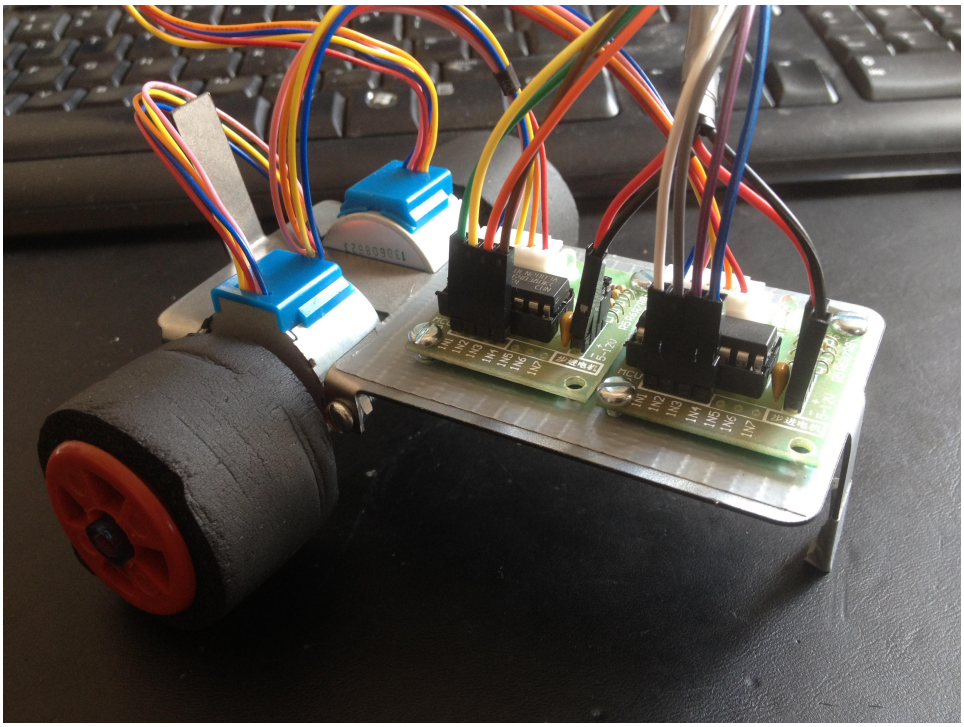
Put the 'typres' on and, through the wider opening on the cotton reel, insert the plastic pipe and push pipe all the way in



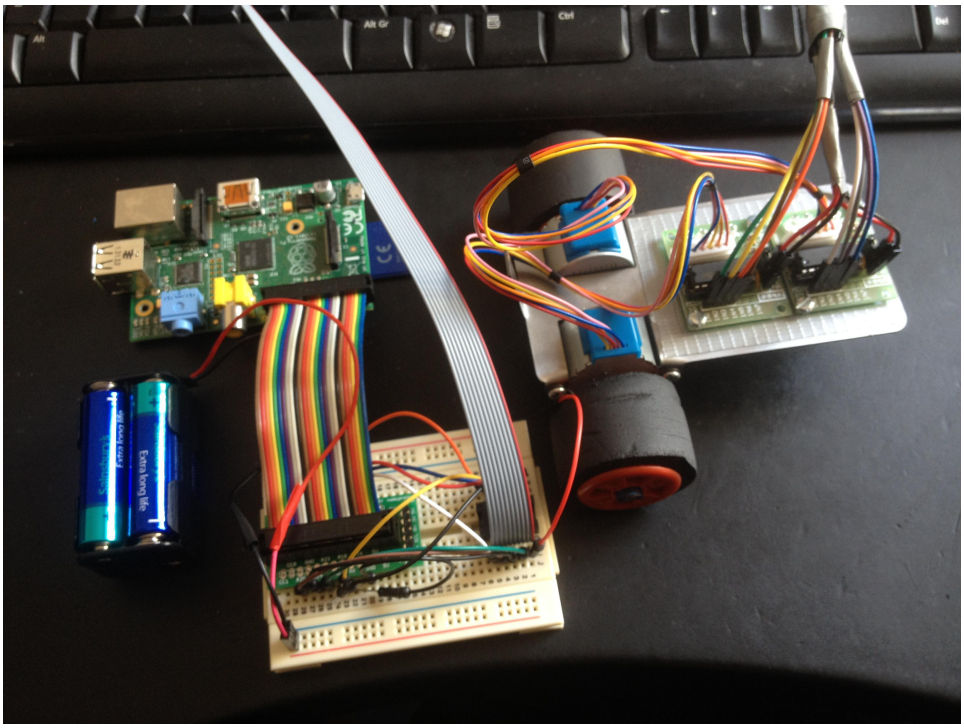
'Squidge' the wheels onto the stepper motor shafts, should be a tight fit, if not try the other end of the cotton reel



The finished robot

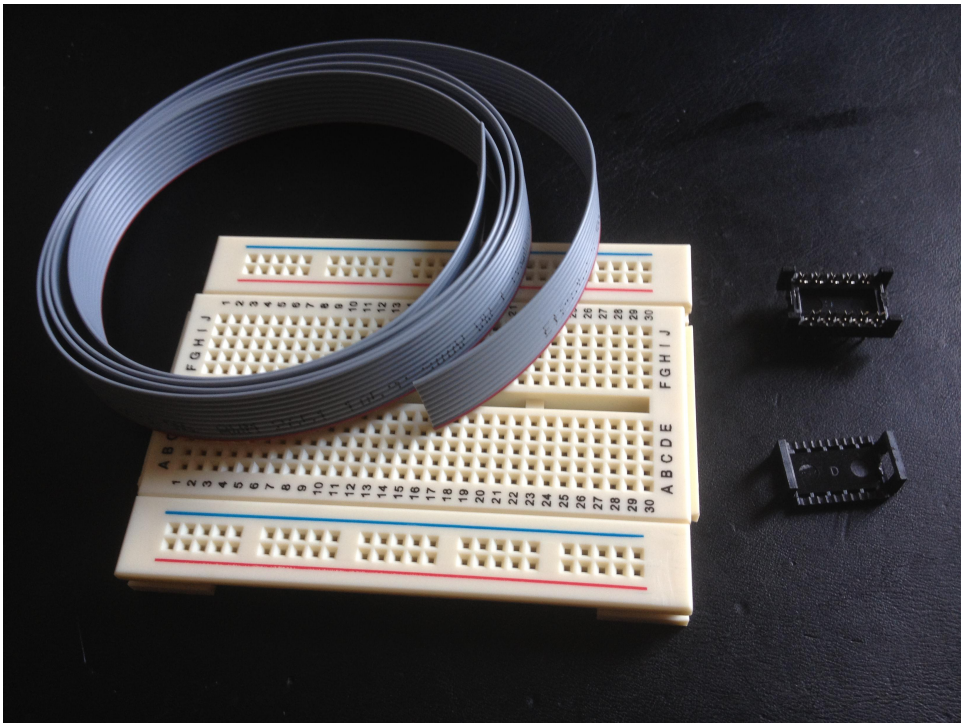


Attached to the Pi using breadboard and cobbler and battery box

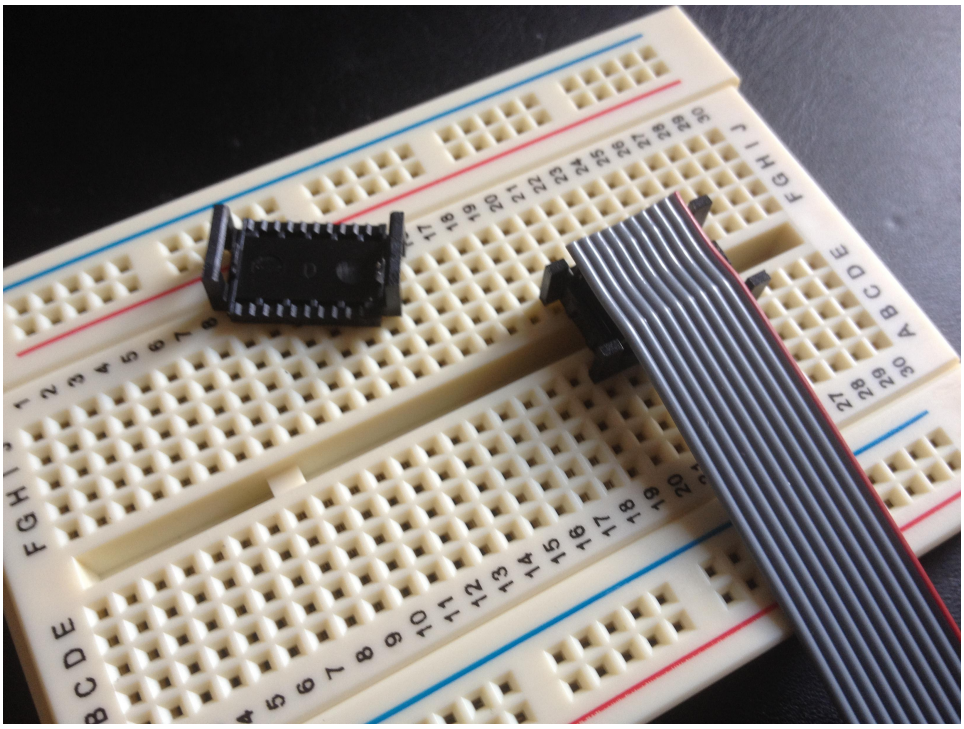


The robot ribbon cable

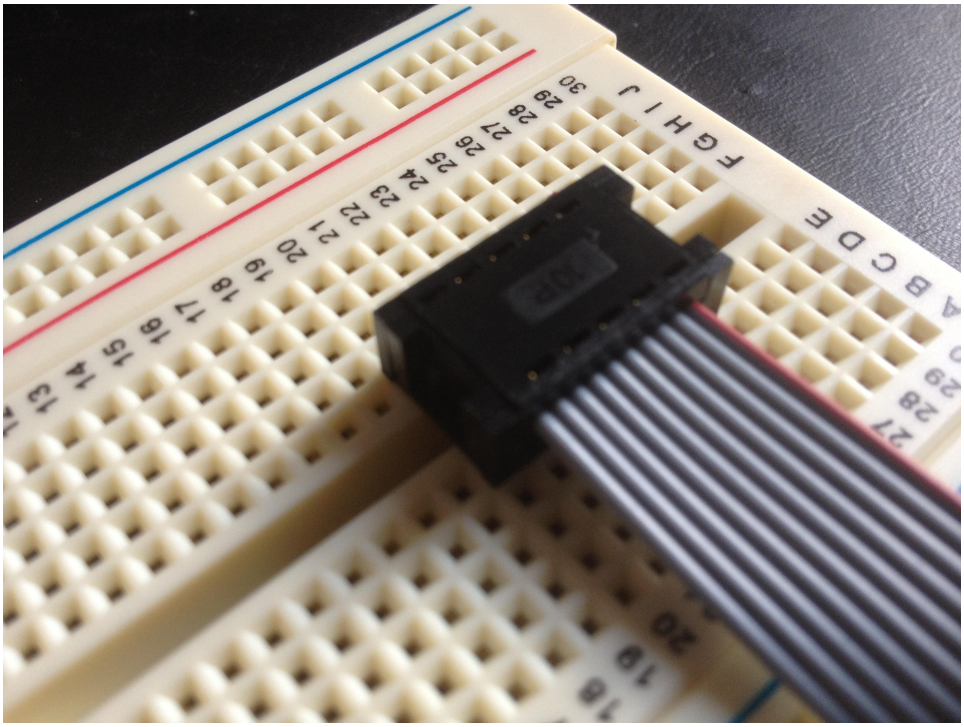
Take out your breadboard, the ribbon cable and connector



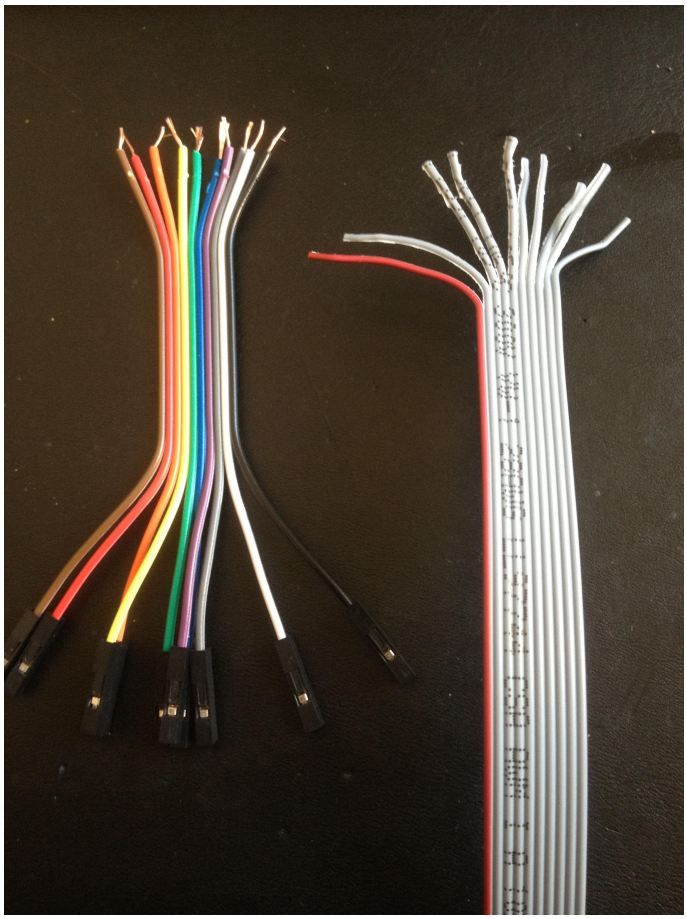
Plug bottom of connector into breadboard, place ribbon cable on top, and place connector top on ribbon cable, press down hard until clicks shut



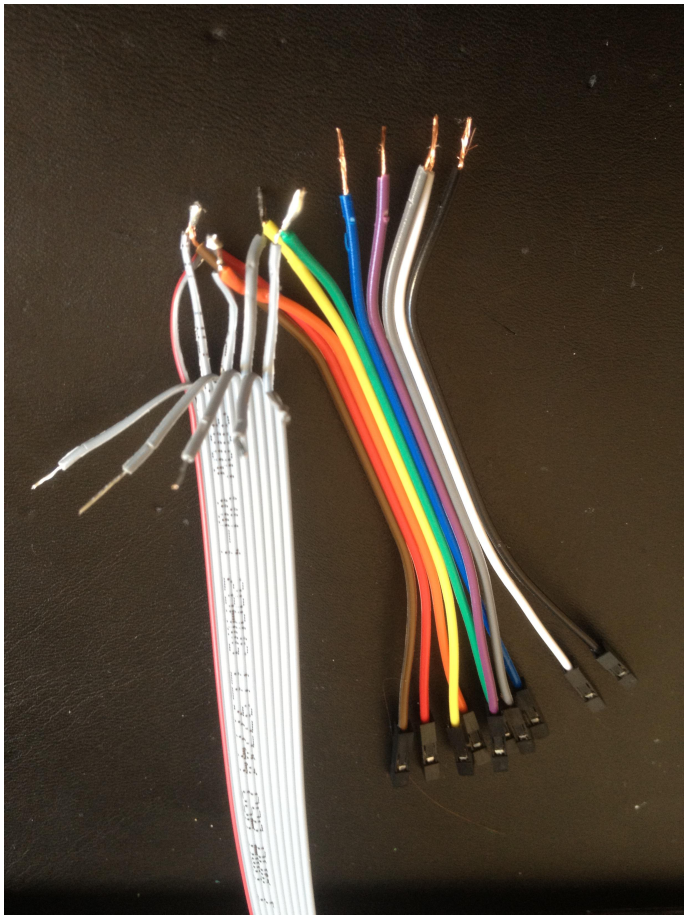
Top fully snapped into place



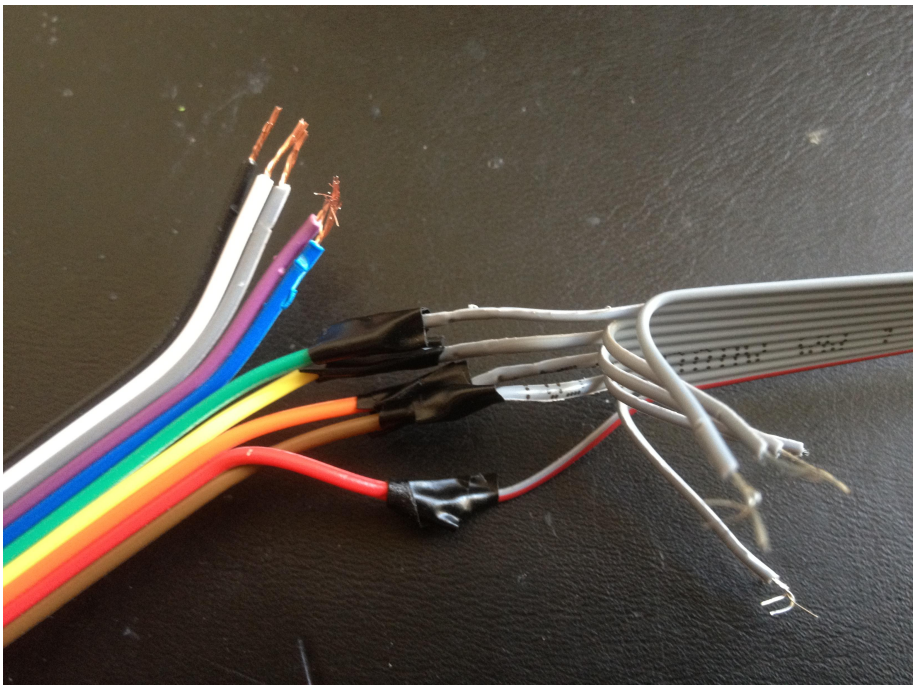
Splay the cable ends of breadboard wires and ribbon cable



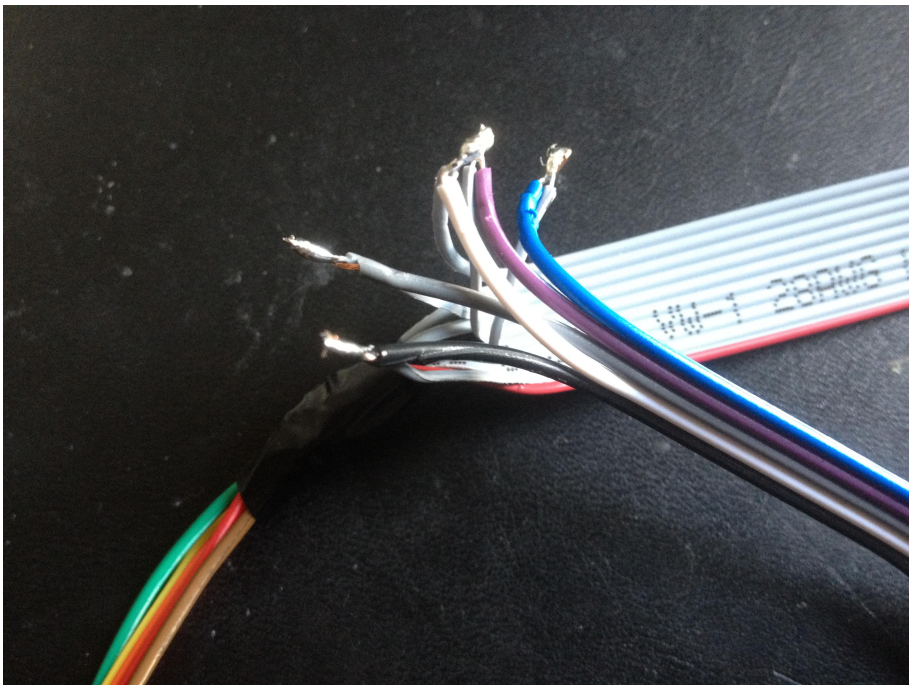
Solder the red ribbon cable wire to the red breadboard wire



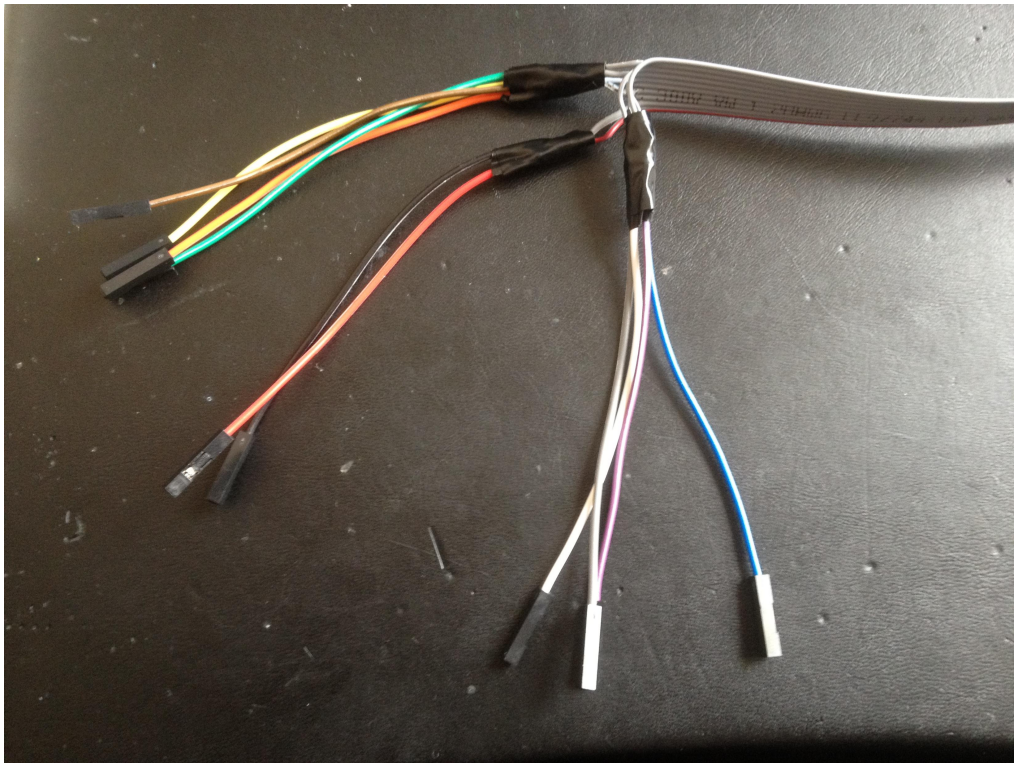
From the red ribbon cable wire fold back alternate wires, then in turn wire up the brown, orange, yellow and green breadboard wires



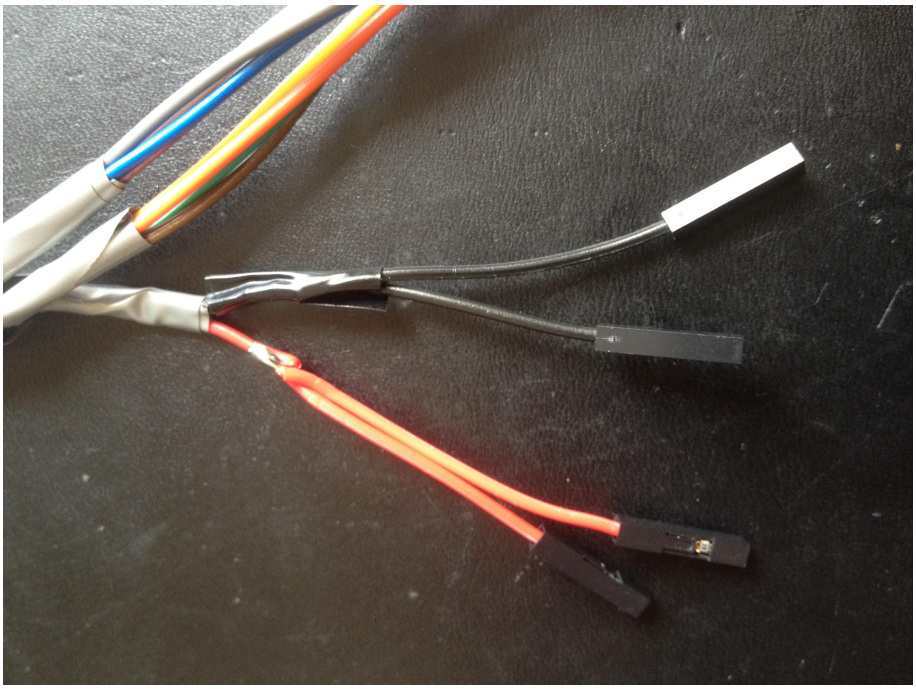
Solder the black breadboard wire to the ribbon cable wire next to the red ribbon cable wire



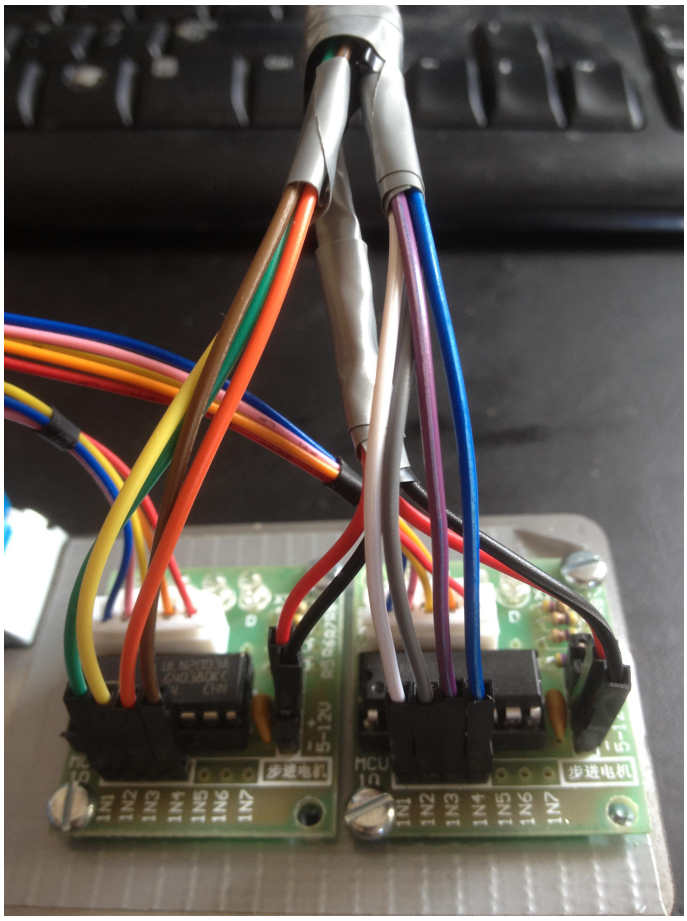
Then solder blue, purple, grey and white breadboard wires in turn to the ribbon cable wires you folded back earlier



You then need to splice in another black and red socket so that you can power both motors

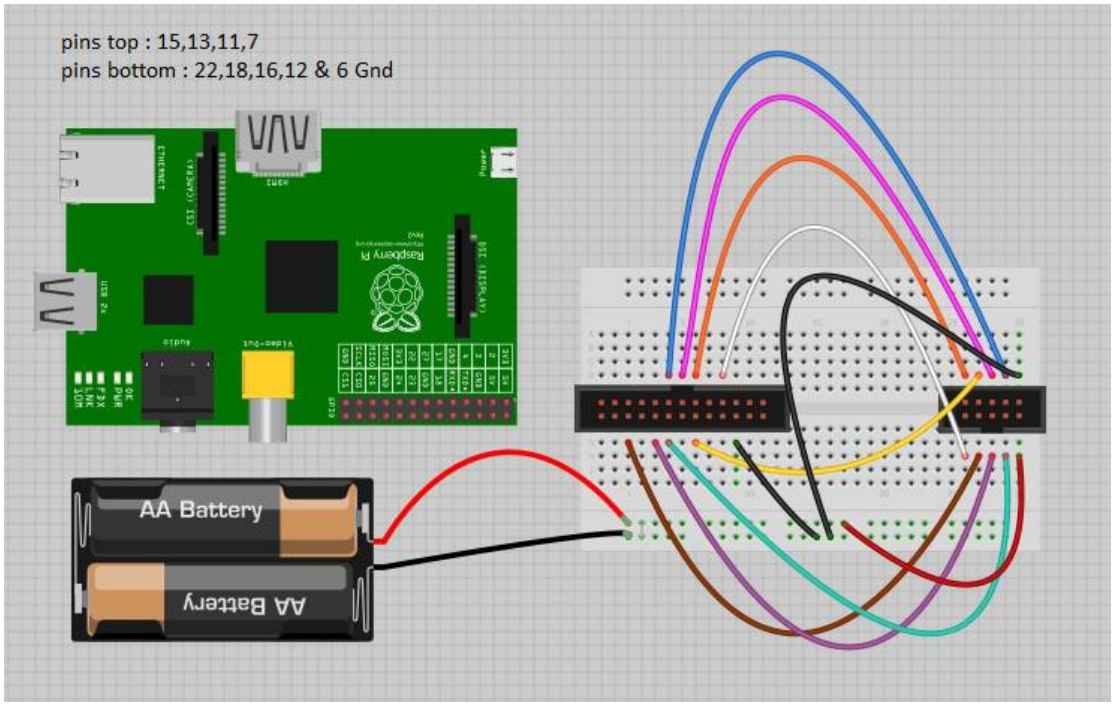


Connect the breadboard wire end of the cable to the robot like this

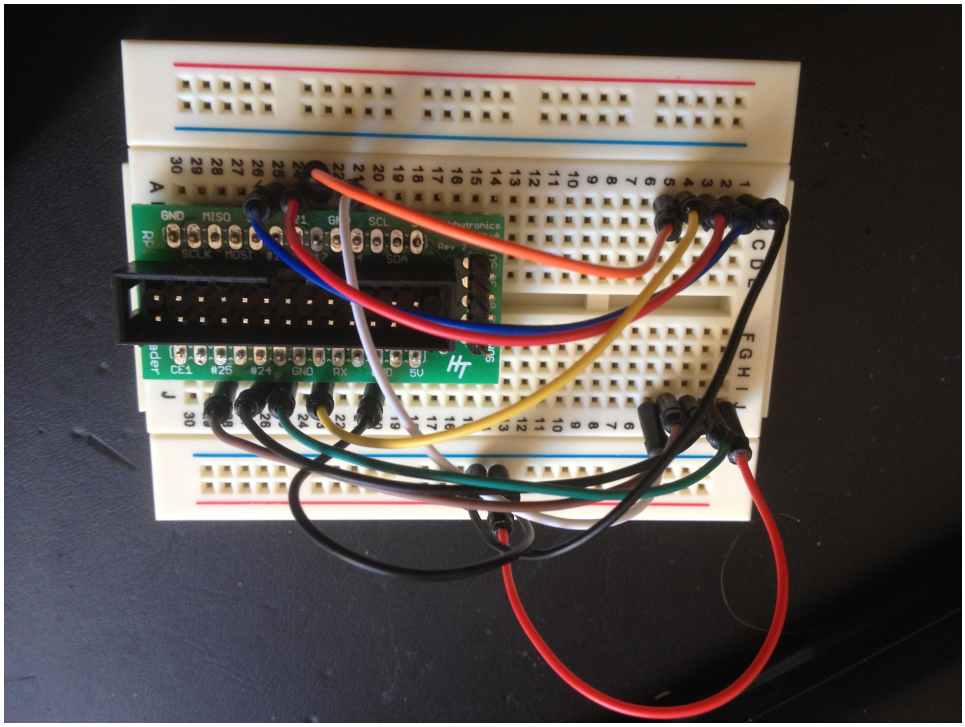


The breadboard

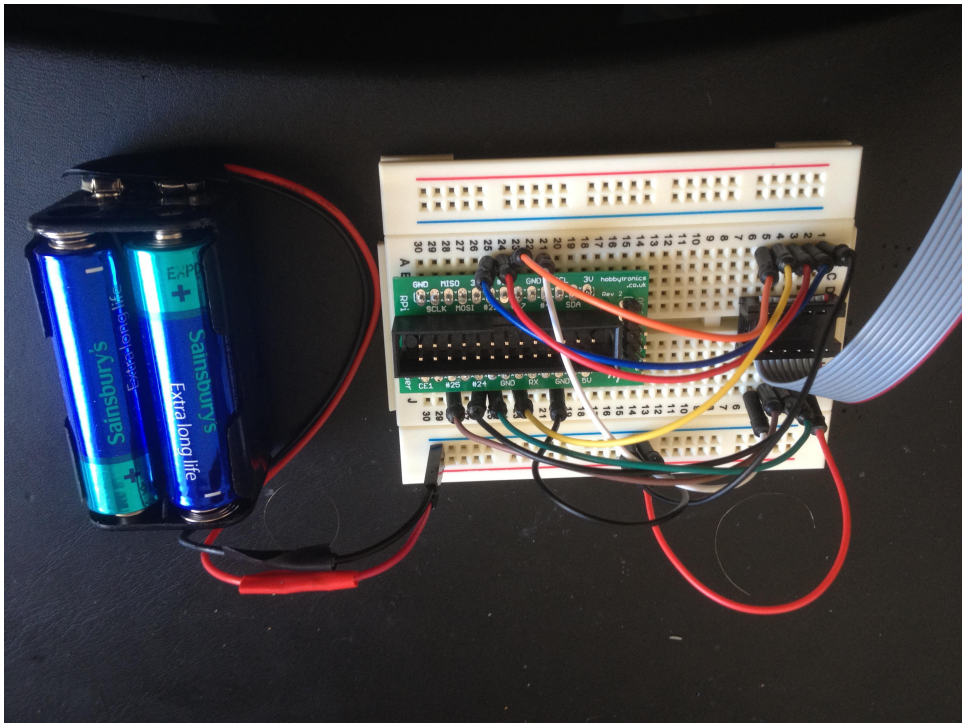
Wire up the breadboard in the following way.



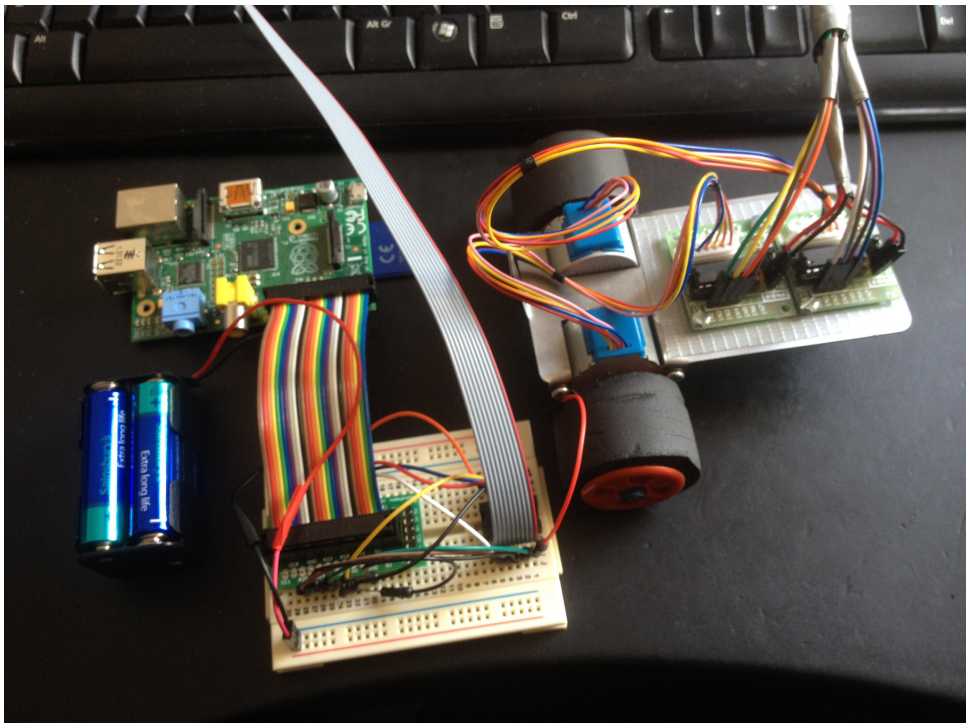
In real life it looks like this



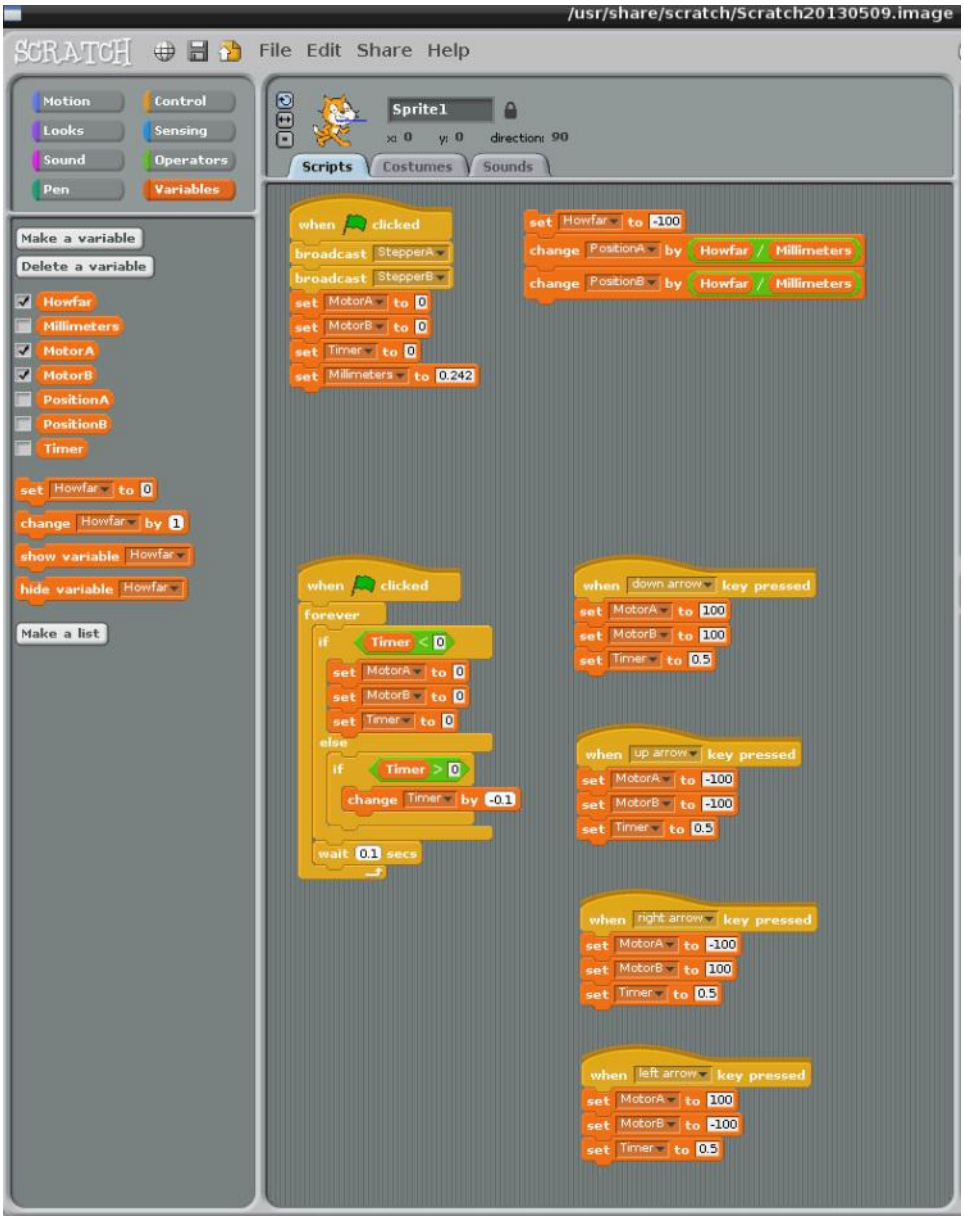
And with the battery box and ribbon cable like this



And connected to the Pi like this



Sample Scratch code

This Scratch code will give you control of your robot using the arrow keys. It will go forward, reverse, turn left and turn right for as long as you keep the relevant key pressed down. When you release the key a timer kicks in and stops the robot.

This sample code also shows you how to use the positional abilities of the robot. You can, in this example, get the robot to move 10cm forwards by setting variable howfar to 100, measured in mm, and then clicking on the code block. Using PositionA and PositionB in this way you could write a much larger program to get your robot to complete a complicated set of movements like avoid an obstacle course.