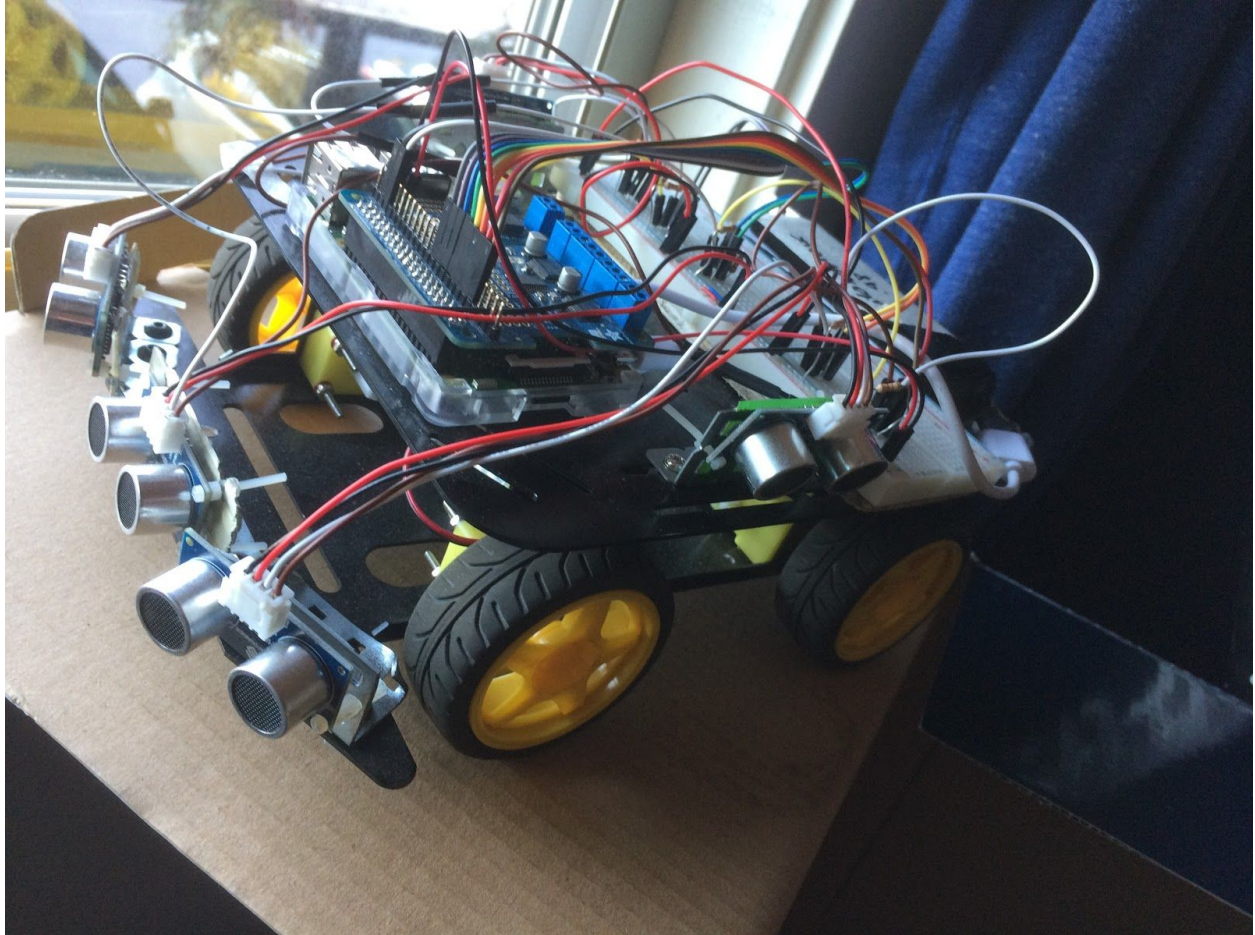


# Creating your own self driving Model Car



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# Overview

Autonomous was an autonomous model self driving car presented by the Innovation Lab of Terra Linda High School at the Maker Faire 2017

## Material

Components:

[Raspberry pi 3](#) -The School bought these in bulk to experiment on but the price can be brought down by just buying these components:

[Wires](#)

[More Wires](#)

[Bread Board](#) - This is half the size than what we used but is much easier to mount.

[Raspberry Pi 3](#)

[Motorshield](#), it comes with 2 motors that will not be used but keep them for further projects.

Battery Packs - 2 battery packs are needed because:

- when the motors turn on current spike will reboot the PI
- Power drain for motors is much higher and need a bigger power source.

[Raspberry Pi Battery Pack](#)

[Motorshield Battery Pack](#)

These batteries are pricier but other cell phone batteries can be bought and work just the same.

[Sonic Sensors](#)- 2 orders are needed for 4 sensors

[Chassis](#) - This chassis is more reliable and the sensors are higher up

[Other Chassis](#) - Some Screws are missing but the sensors are low and able to see more obstacles.

You can buy any chassis with DC motors, these are just suggested because we've tested them

[Spacers \(Nylon\)](#) - These will be used to attach the sensors to brackets. The screws are a little thick so with a file open the hole just enough, just beware of some electronics on the sensor to not destroy anything.

Resistors:

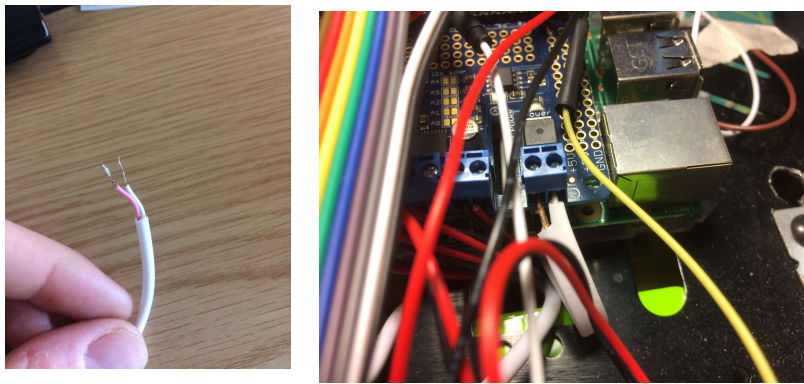
4 x 1k Ohm 1/4w Resistors

4 x 2.2k Ohm ¼ watt resistors

### **Miscellaneous:**

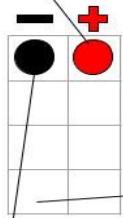
Metal brackets as seen in the photo, use sheet metal with holes spread apart that line up with the sensor. Make sure the metal doesn't make contact with the bracket, duct tape lining the bracket protects it. Screws for mounting all the hardware and brackets were from our closet without a name so electronic stores near you most likely have screws that fit the chassis.

## Assembly

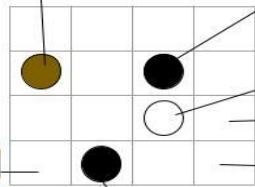


Charging Cables. The batteries you ordered will hopefully come with a micro USB. The Raspberry Pi has a port for a micro USB but the motorshield does not. Take a micro USB wire, cut off the micro USB part and cut around the plastic to get the red and white (or clear) wire on their own. Strip them and twirl the copper wire to hold it together as you add a little solder to hold all the copper hairs together.

This is the red wire or positive wire from the sensor or VCC



This is the Trigger wire



This is the trigger wire from the jumper wire or the big rainbow wire

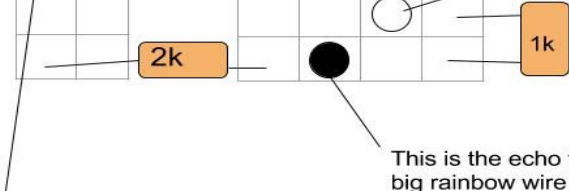
This is the echo wire from the sensor (white wire)

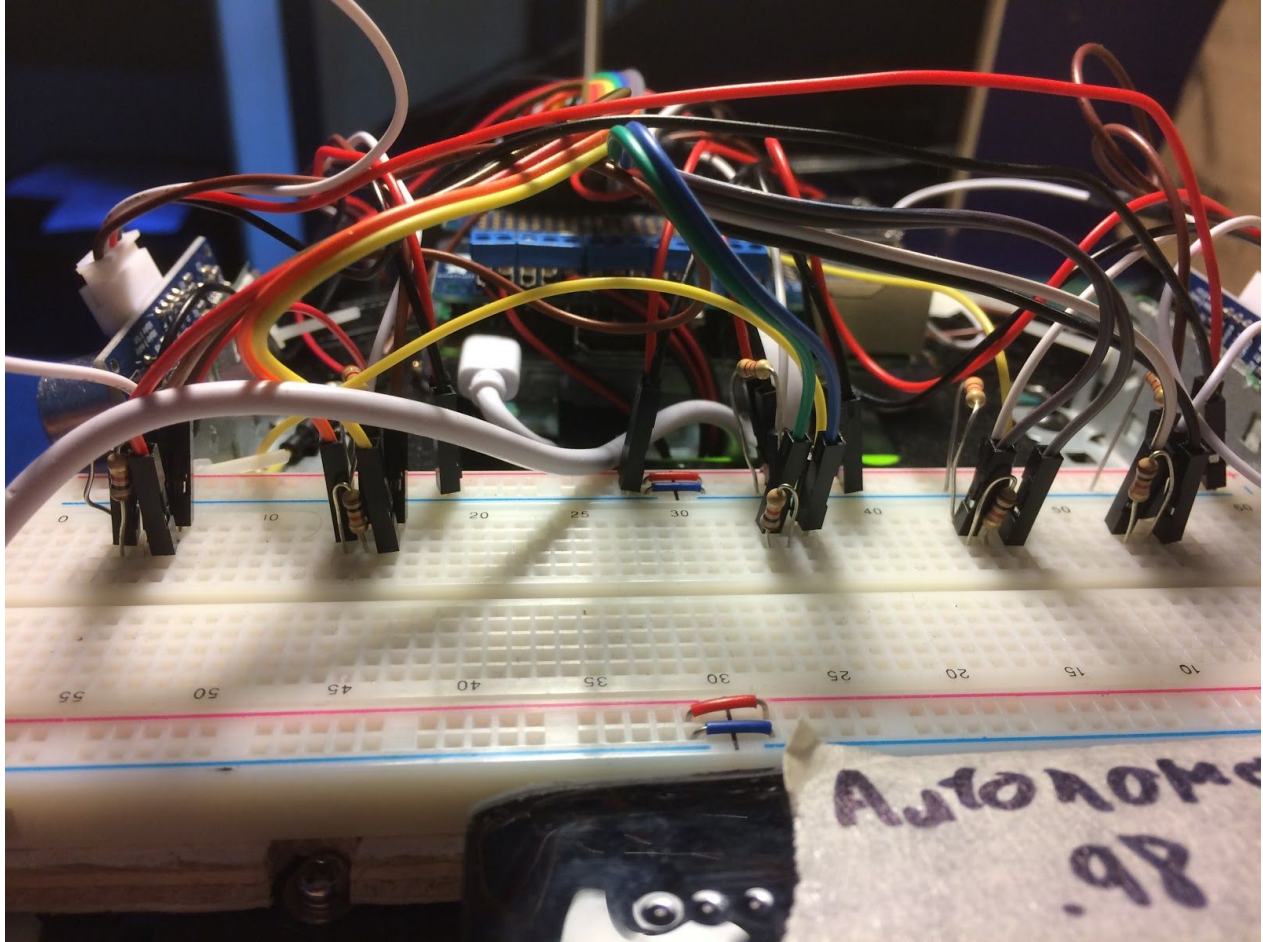
This is the echo from the Jumper wires or the big rainbow wire

This is the black wire from the sensor, the ground

2k

1k

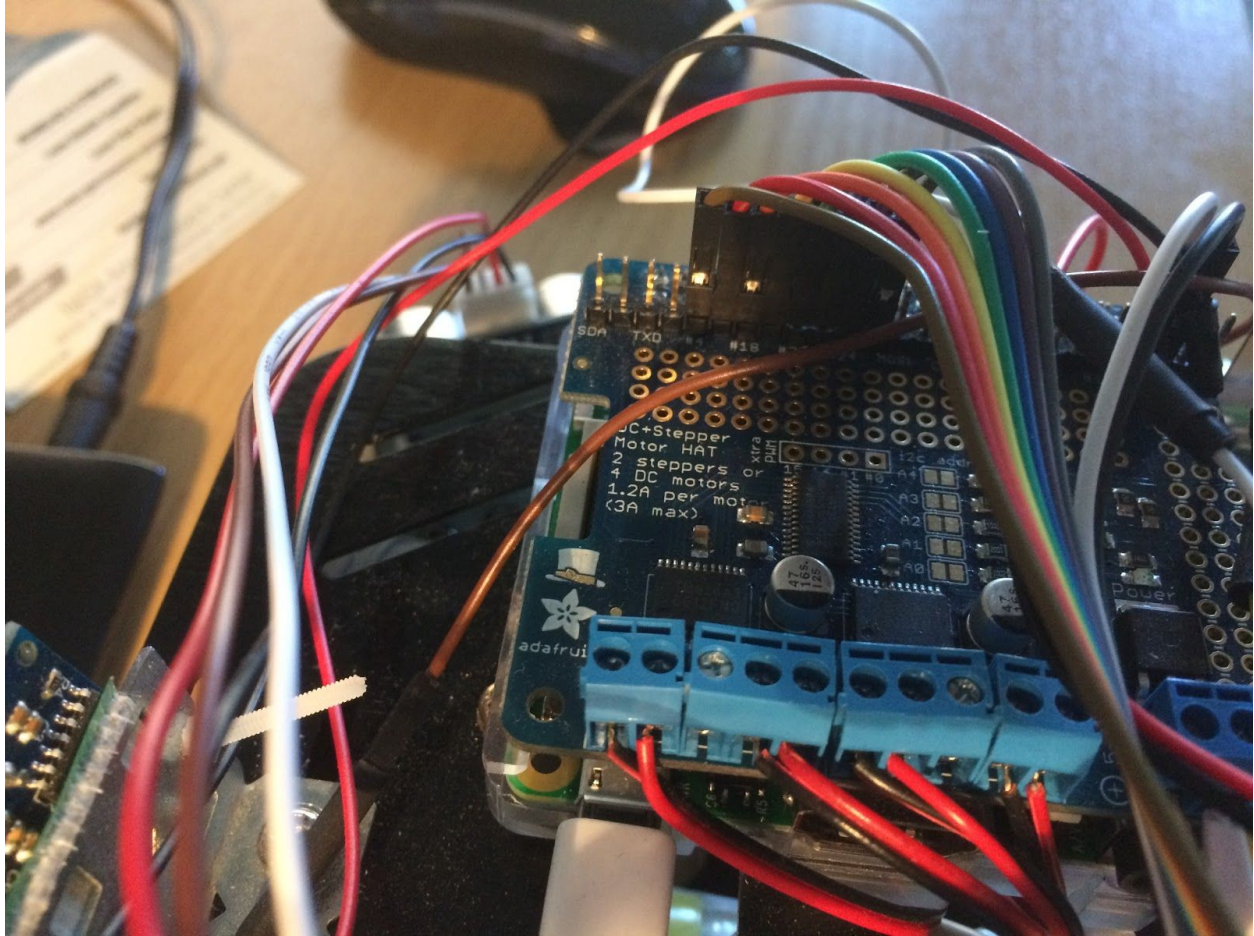




These are the GPIO wires to the breadboard. The diagram is above and the real life photo is here.

	Left	Front Left	Front Middle	Front Right	Right
Echo	Brown	Orange	Green	Purple	White
Trigger	Red	Yellow	Blue	Grey	Black

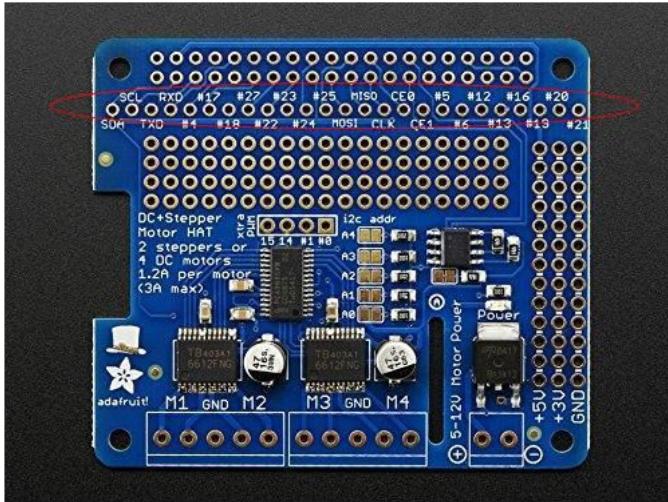
The Middle Sensor is disabled in the code but all the wires are still necessary. The middle sensor is disabled due to it sometimes picking up the other sensor's echo and vice versa.

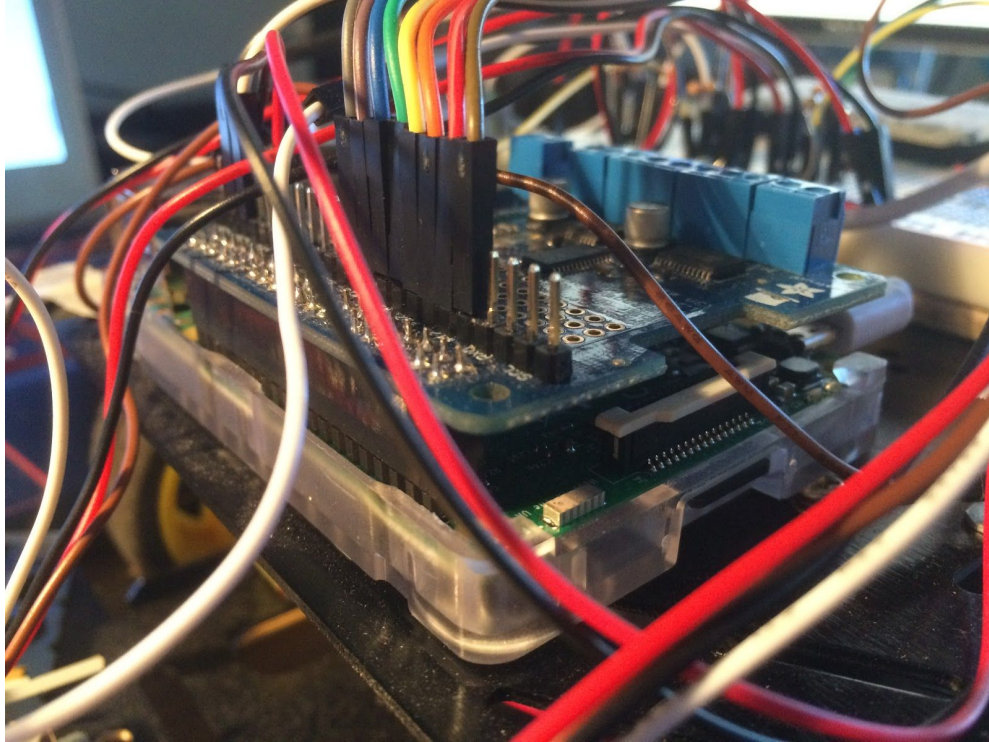


The Motor shield should be soldered accordingly. When inserting the DC Motors' wires into the motor shield leave the middle one or ground (GND) open.

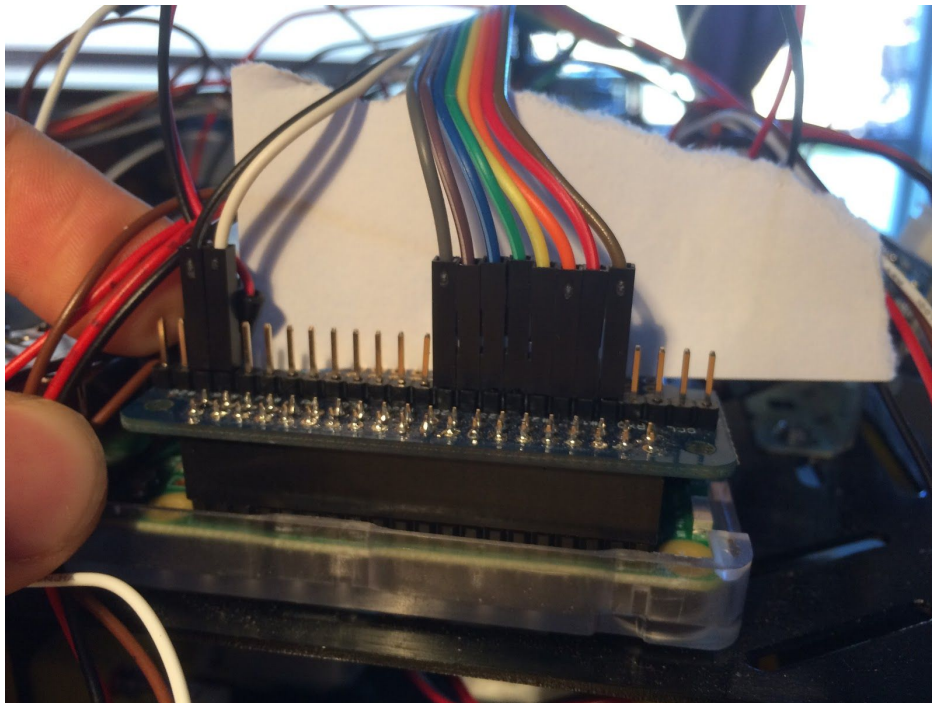


Buy one of these but at least 25 pins long and must be cut down to 25 pins and soldered to the motorshield. Solder with the longer pins on top.



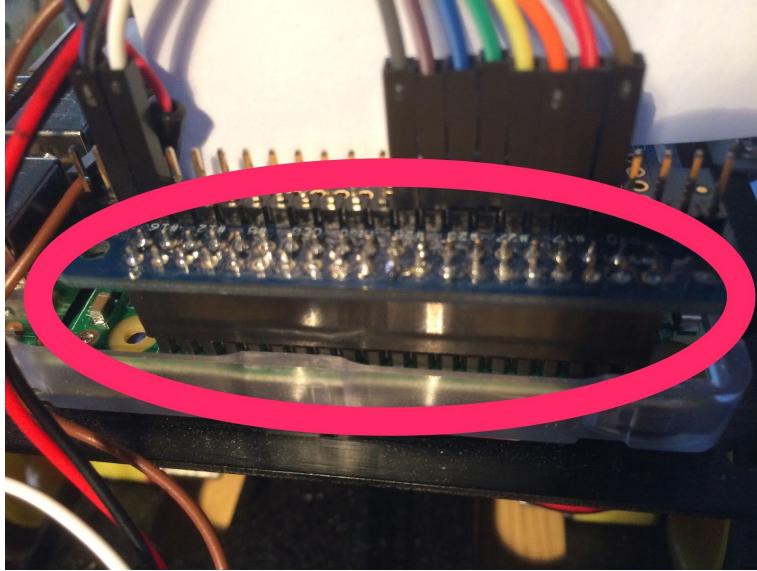


Like this. This pins should be positioned like this.

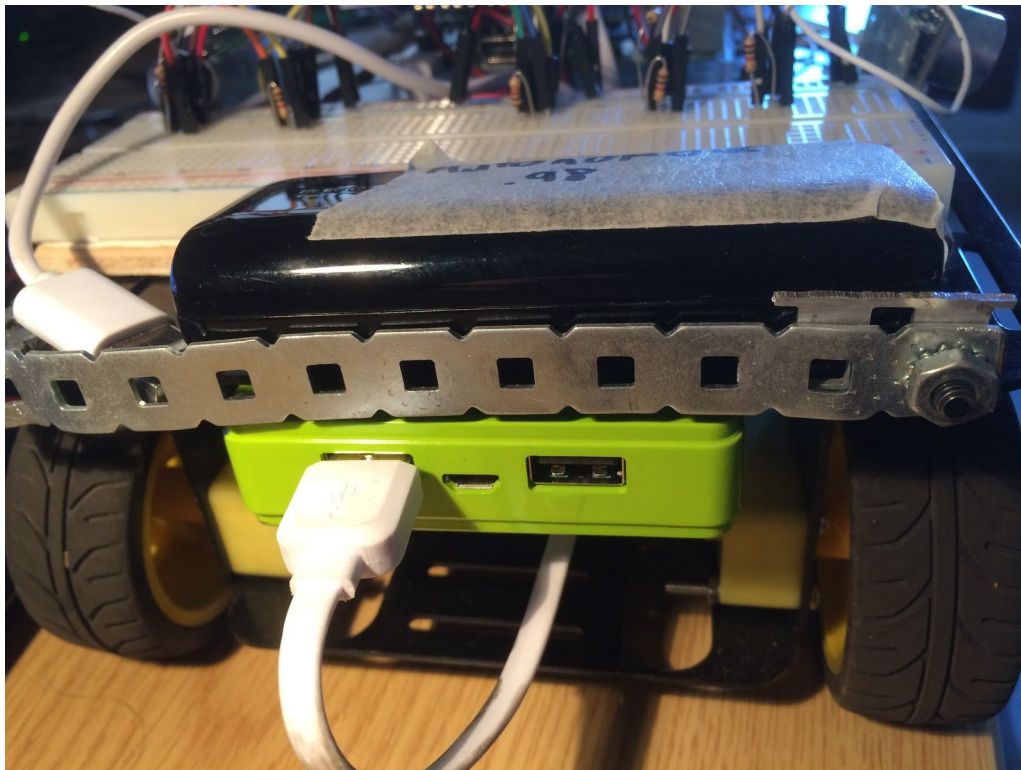


The GPIO jumper wires should be mounthe like this.

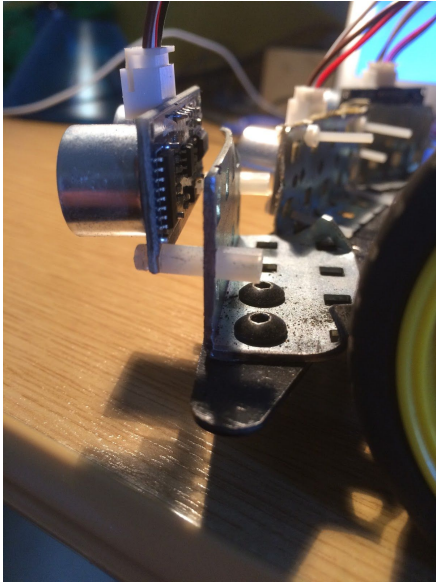




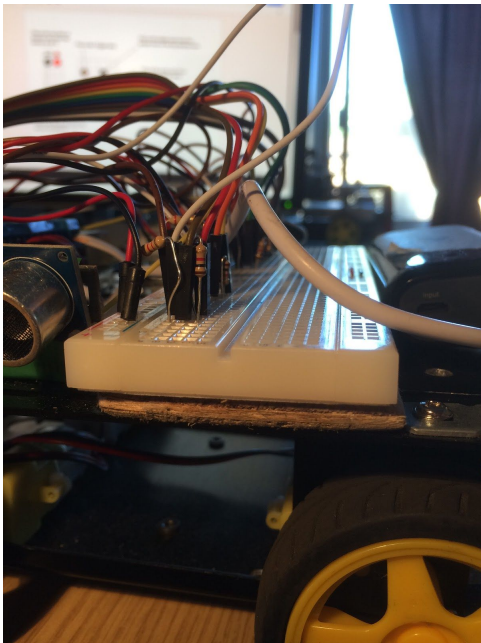
Mount the motor shield onto the raspberry pi.



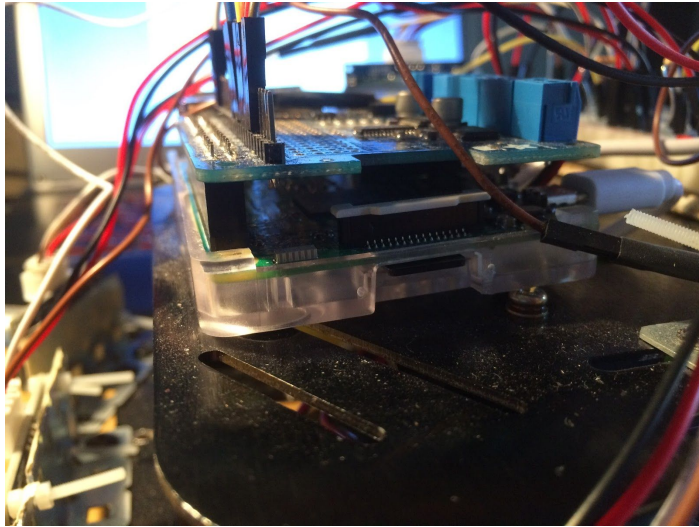
We jerry rigged the batteries and is impossible to replicate but using screws and metal strips makes it possible.



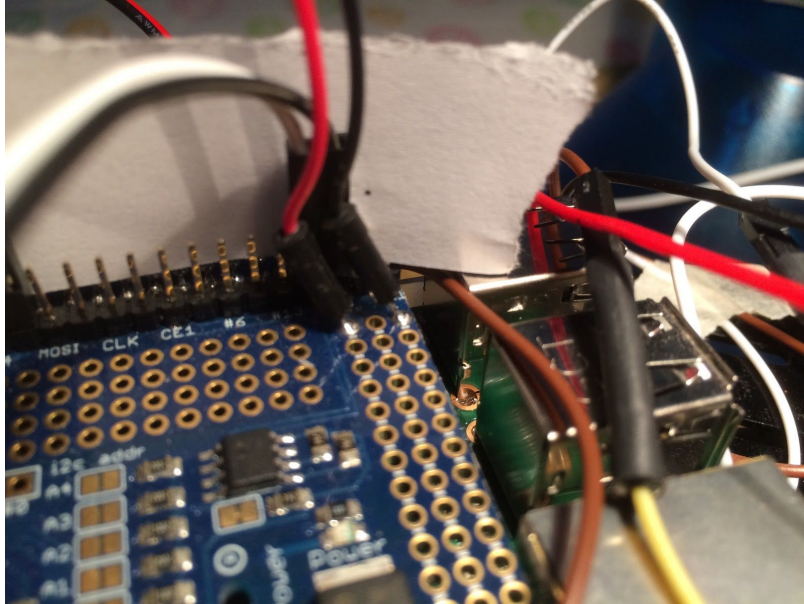
The Sensors are just mounted with plastic spacers to the metal bracket and have screws to mount the bracket to the chassis.



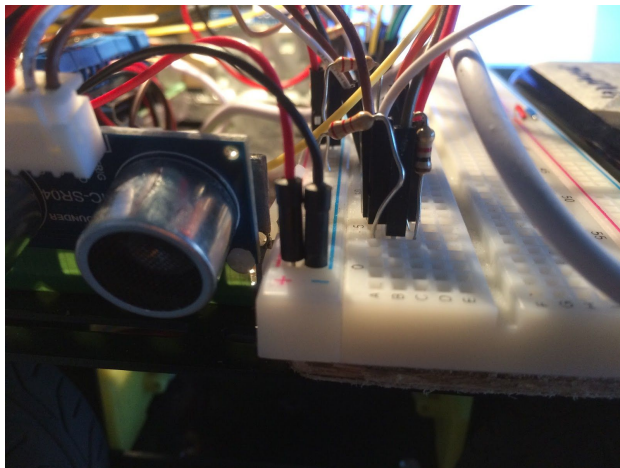
The bread board is elevated on some plywood so there is a flat surface for the bread board to stick on and holes making space for screws and the plywood is held down by tiny screws. Again, this is jerry rigged and the bread board you bought is half the size and easier to mount.



The raspberry pi is mounted on the bottom part of the shell if you buy a pi with one. You can use plastic screws as well. Make sure the raspberry pi nor the motor shield makes contacts with the chassis because it will short circuit, metal on metal.



To bring power to the bread board, solder 2 wires and solder them here and connect them like this:



## The Code

The source code and the instructions on how to build and deploy the software onto the Raspberry PI can be found on github at the following location:

<https://github.com/Autonomous-Dev-Team/autonomous>

If you are interested to contribute let us know!