

Sumo Expansion Pack



Explanation

The Microbri^c 'Sumo Expansion Pack' gives your Viper Sumo capabilities!! Take on opponents in a battle of wits using your programming skills and knowledge to win.

The sumo pack contains a servo controlled scoop which you have under your control to attack your opponent with. Your Viper knows to attack when the bump sensors at the front are activated. This triggers your program into attack mode!!

To build a Sumo Viper you will need the 'Line Tracker Expansion Pack'. This is used to detect the border of the Sumo ring so your Viper doesn't drive over the edge.

The Sumo ring is either a round white ring with a black border or a (More popular design) black ring with a white border. This can be as simple as some black electrical tape forming a round border on a white surface to a specially built raised Sumo ring. See the end of this datasheet for more info on the Sumo ring design.

How it Works

You should already be familiar with the bump sensors that come with the Viper and the bump sensors on the front of the Sumo module are no different.

Controlling the position of the servo is pretty straight forward you simply send a serial out command (Serout) stating the position you want the servo to be at between 1 and 255 and the onboard microcontroller takes care of the rest.

Eg:

```
Serout P6,i2400,[128] ;Sets the servo to the centre position through pin 6
```

There is a special setting that turns the servo off and saves power. By sending the Sumo module a [0] the servo stops trying to move to a position which means it can be rotated by external forces. To turn the servo back on just send it another command.

Pack Contents

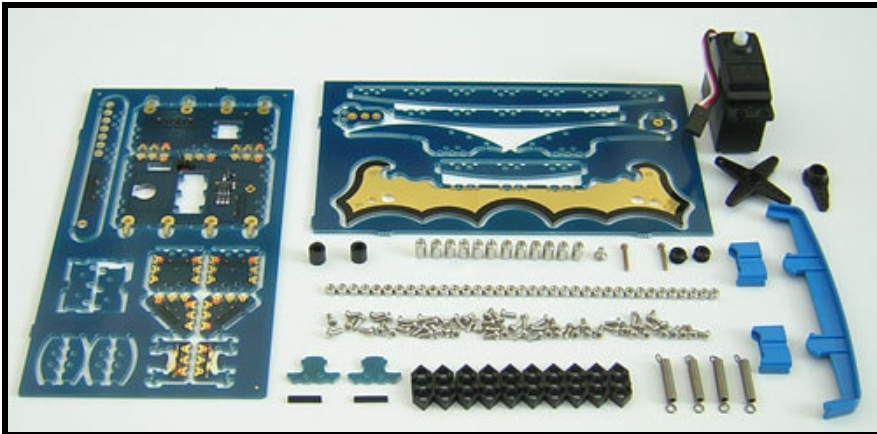


Image 1 – Pack contents

Pack Contents	
Sumo Base Module	1
Sumo Scoop	1
Fins	2
Strip (3)	1
Strip (5)	1
Strip (7)	1
Sumo Blade	1
Straight Modules	2
Right Angle Modules	2
Quarter Cap Modules	4
Bumper Inserts	2
Scoop Actuator	1
Scoop Horn Part A	1
Scoop Horn Part B	1
Plastic Brics	10
L3 Microbric Nuts	36
L8 Microbric Spacers	12
Microbric Screws	60
14mm Screws	2
Plastic Bumper	1
Plastic Bumper Retainers	2
Rubber Spring Elastomer	2
Springs	4
Servo	1
Rubber Gromets	2
Rubber Spacers	2
Servo Horns	2
Servo Horn screw	1

Assembly

Step 1> Assemble the Scoop Mechanism

Push the 4 springs onto the Sumo servo module as shown. Note that the loop at the end of the spring goes on the top side with the screw coming from underneath and the nut tightens down on to the spring. Do this for all 4 springs.

Next push the springs (one by one) onto the scoop module making sure that the scoop is the correct way up (see image 3). Once all 4 springs are in place use another 4 screws and 4 nuts to hold them there.

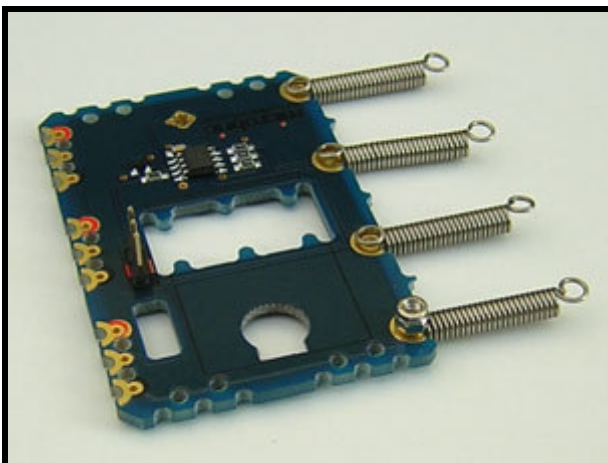


Image 2 - Servo module with the spring loops on top with the nuts on top

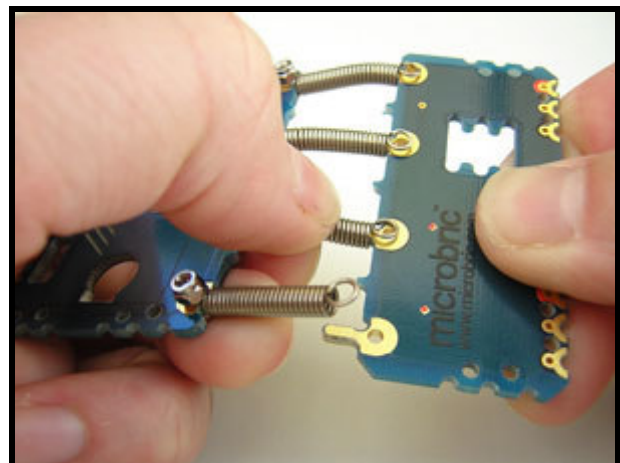


Image 3 – Push each spring onto the scoop one at a time

Now assemble the horn that goes on the scoop, break these two parts out of the array and position them as shown in image 4. Then take an 8mm spacer and push it between them this will be a tight fit.

You will now need to screw the spacer into place using two 5mm screws on either side see image 6.

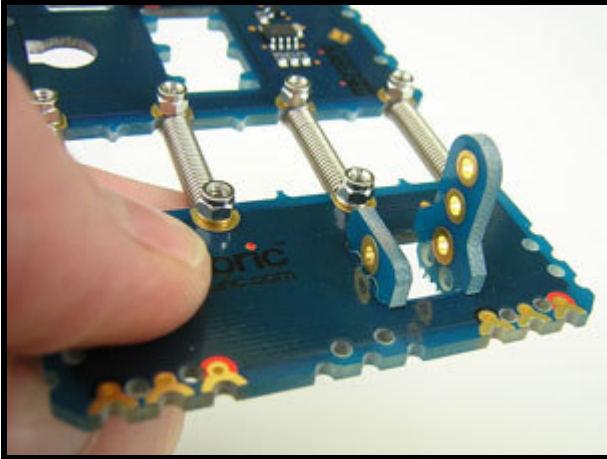


Image 4 – Position the horn as shown

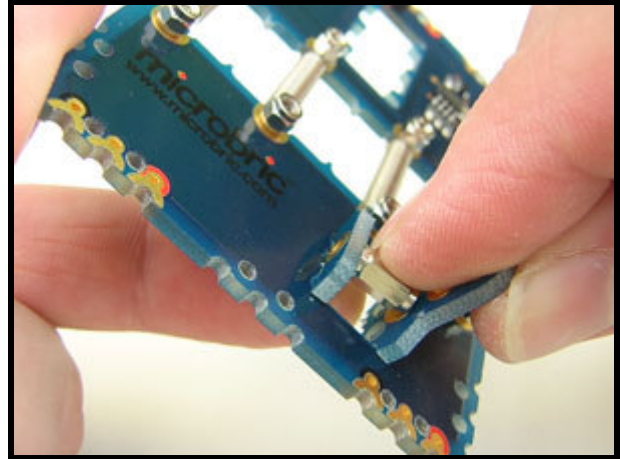


Image 5 – Push in an 8mm spacer

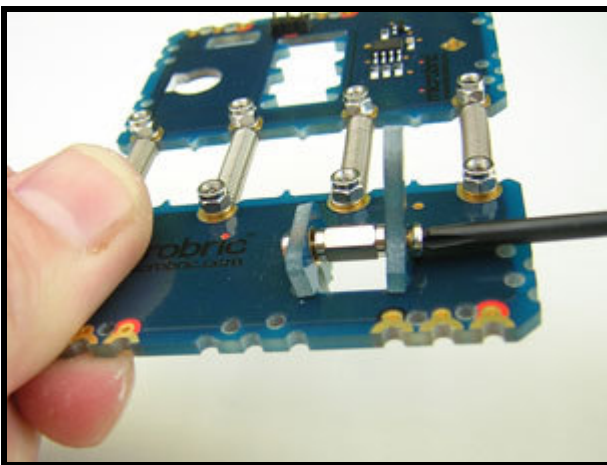


Image 6 – Use 2 x 5mm screws

Step 2> Mounting the Servo

Push two 8mm spacers through the mounting holes of the servo and then push the two rubber spacers over them. Make sure that you do this at the same end that the output shaft is at. Place this end of the servo through the mounting hole and attach one of the two servo mounts using two 5mm screws.

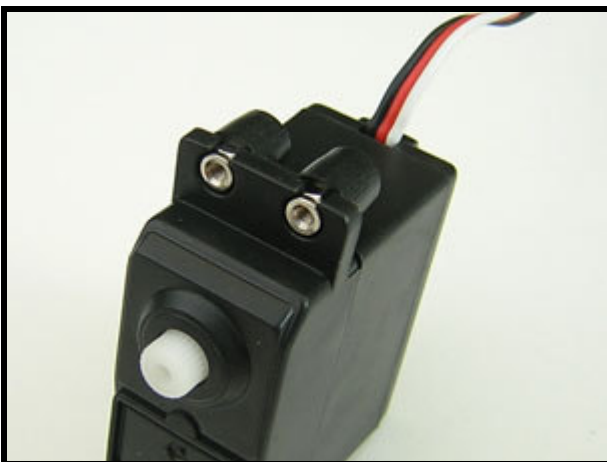


Image 7 – Push in two 8mm spacers then the rubber spacers go in over them

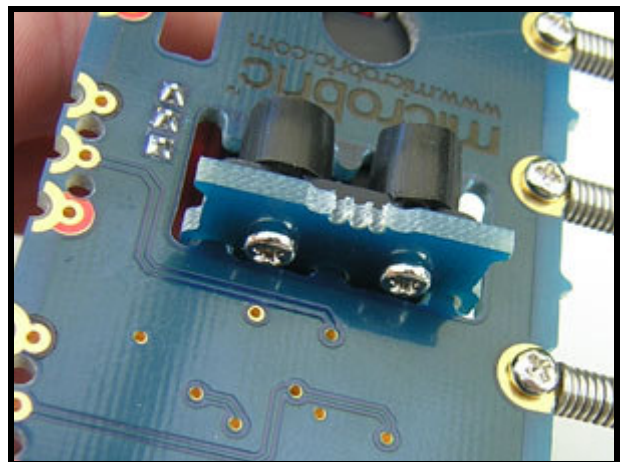


Image 8 – Screw the first servo mount into position

The second servo mount is a tight fit, so you will need to push this in hard. Once in, tighten another two 5mm screws to firmly secure the assembly.

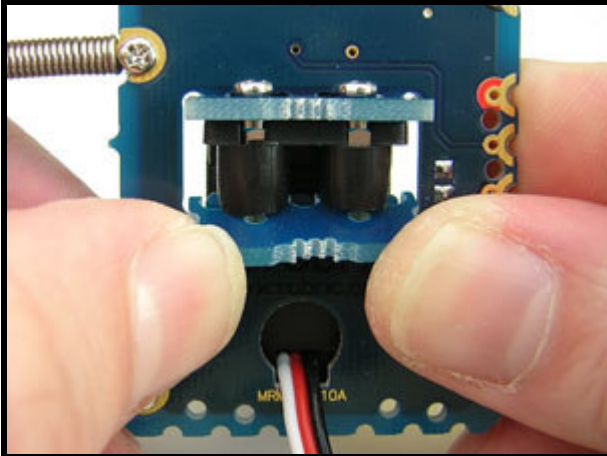


Image 9 – The second servo mount is a tight fit

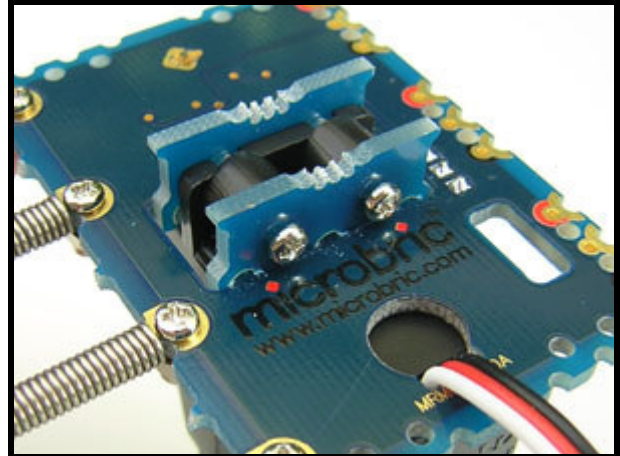


Image 10 – Once in position secure with two 5mm screws

Step 3> Constructing the Actuator Arm

Take one of the two 14mm screws and screw on a nut with the non-round end towards the head of the screw. Position this through the single hole at one end of the actuator arm and fit another nut facing the opposite direction onto the 14mm screw. Tighten the two together and they will move freely in the hole.

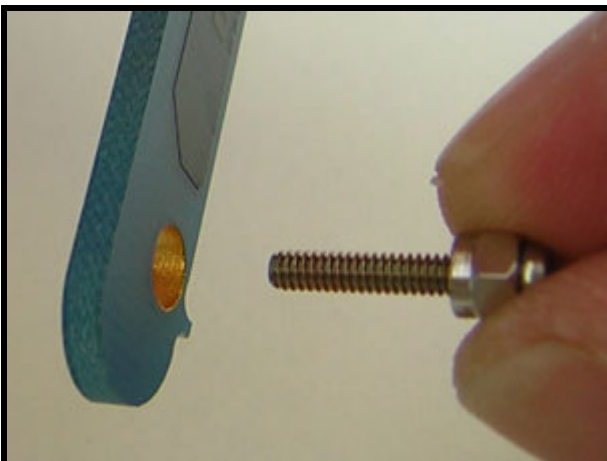


Image 11 – Fit a nut to the 14mm screw

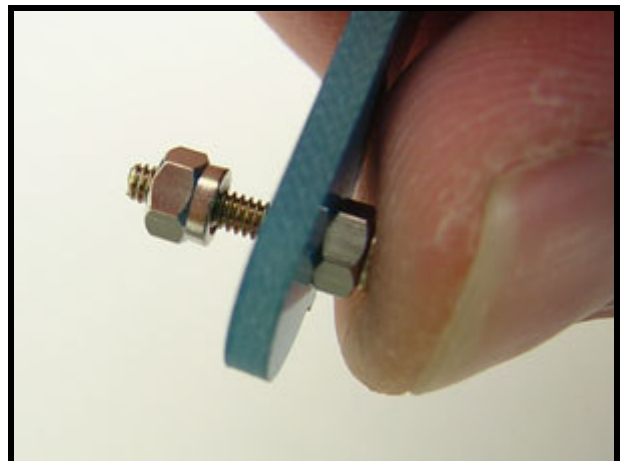


Image 12 – Fasten a second nut

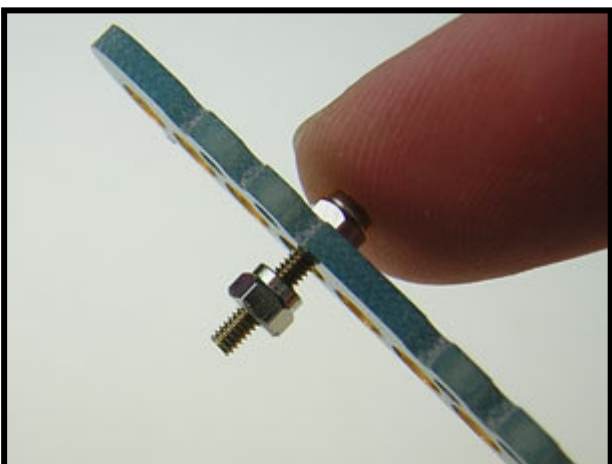


Image 13 – Do the same at the other end

Do the same at the other end in the middle hole of the actuator arm.

The next part of this step involves making the top hole in the servo horn a little larger. To do this take a 5mm screw and screw it all the way into the hole until it starts to spin. Now remove the screw and the hole is now larger and ready to easily accept the 14mm screw.

Push the 14mm screw into the resized hole and attach another nut. Tighten this together firmly using a brick as a spanner.

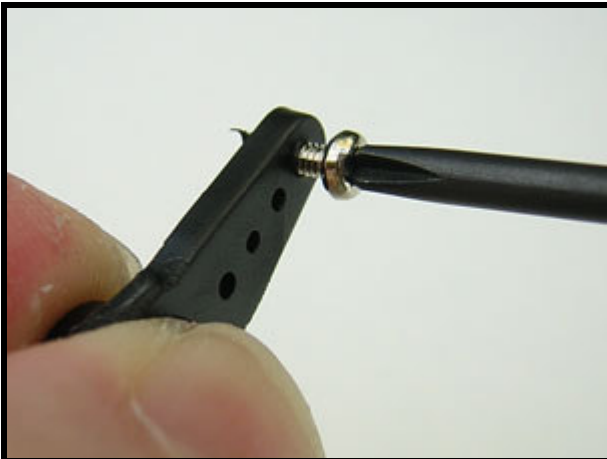


Image 14 – Open up the hole using a 5mm screw

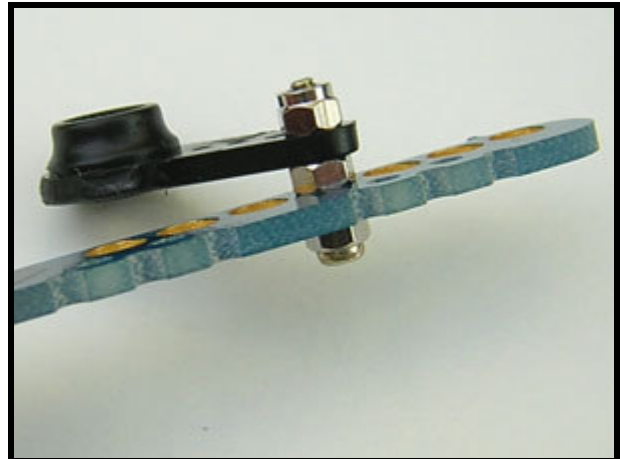


Image 15 – Use a brick as a spanner to tighten

Attach the front of the actuator to the scoop as above again using a brick as a spanner to tighten.

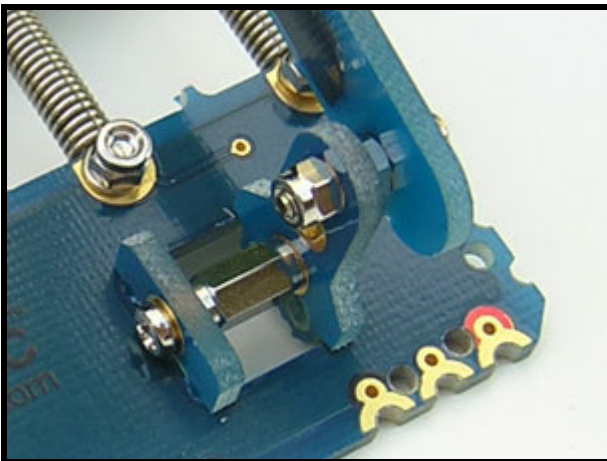


Image 16 – Use a brick as a spanner to tighten

The other end of the actuator arm gets attached latter.

DO NOT ATTACH THE SERVO HORN TO THE SERVO YET!!

Step 4> Attaching the Bump Sensors

The bump sensors are the same as what you have already received with your Viper. To assemble fit the rubber elastomer into the bump module then position the bumper insert and slide over the bumper housing. Attach the 'Sumo Blade' to complete this stage.

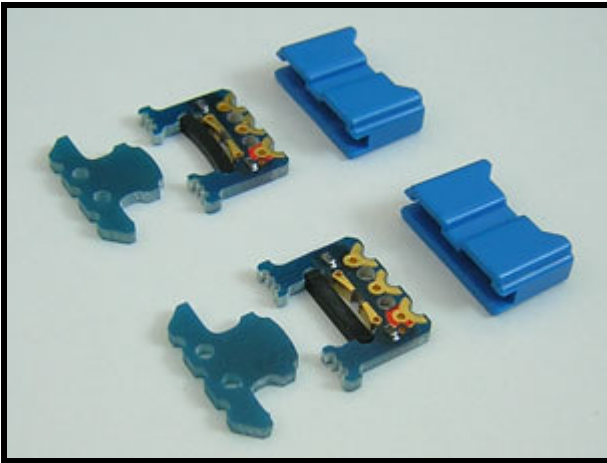


Image 17 – Take note of where the holes in the bumper inserts are

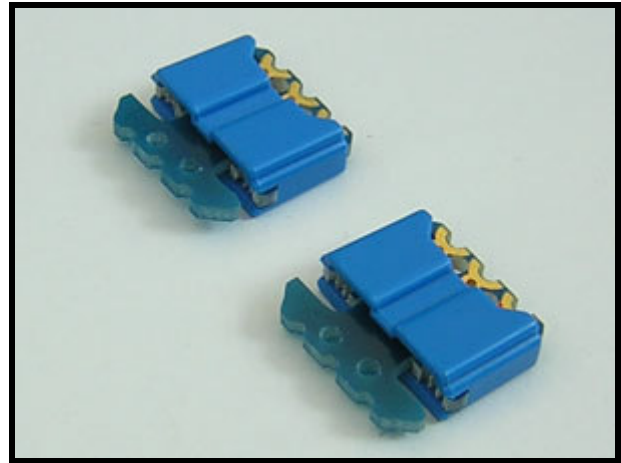


Image 18 – Assembled bump sensors

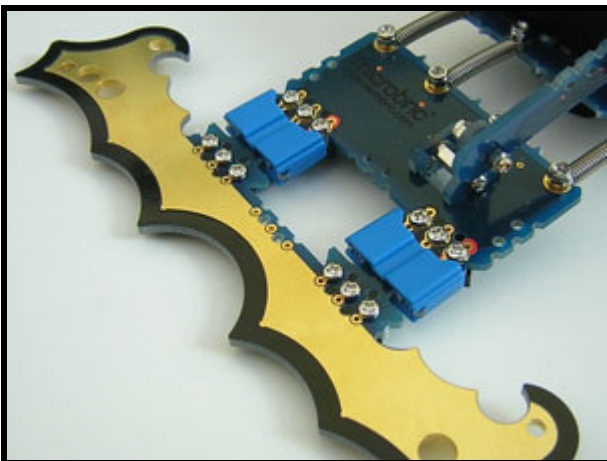


Image 19 – Attach the 'Sumo Blade'

Step5> Calibrating the Servo

WARNING THIS MUST BE DONE BEFORE POWERING UP THE SUMO MODULE!!

When you receive your servo there is no way to tell what position it is currently at, so it must be calibrated to be at the centre position.

1> You must remove the servo horn from the servo before applying power to the Sumo module each time you build a new robot.

2> Power up the Sumo module by connecting it to the motherboard and attach the servos plug. The servo should move to the centre position. To check this use the end of your MicrobriC screwdriver and press it into the reset hole as shown. This will ensure that the servo is in the centre position.

3> Attach the servo horn so the front scoop is inline with the servo module. This will give you the maximum swing for the scoop (up and down).

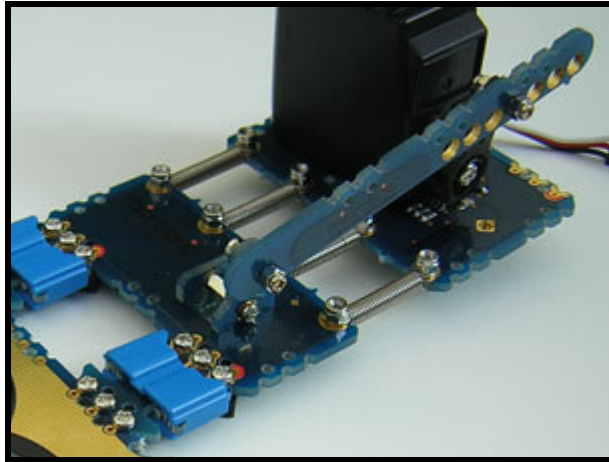


Image 20 – Servo board and scoop board are inline

Performing the above calibration before attaching the servo horn ensures that the servo can't try to move to a position that isn't possible. If this was to occur the servo may break under its own force or break another part of the Sumo mechanism.

Connecting the Sumo Module

The following image shows the serial data to control the servos position goes to the middle MicrobriC edge whilst the signal for the left and right bumpers come from their respective sides.

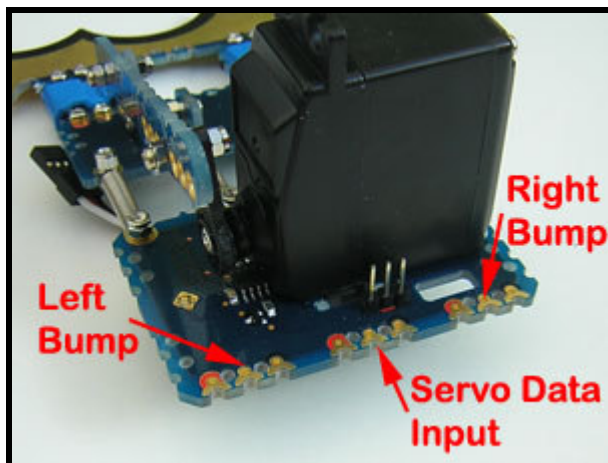


Image 21 – Data and signal connections