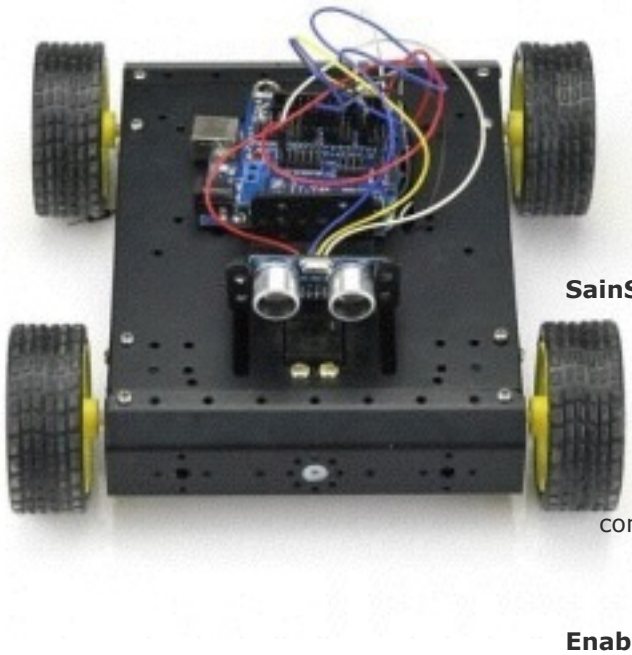
4WD mobile robot platform Installation manual v1.1

by Glenn Mossy, Dec 06, 2014



SainSmart 4WD Mobile Robot Platform:
2012 latest 4WD aluminum mobile robot platform.

Hold many controllers, drivers, sensors and RF modules etc.
Supports plate with controller mounting holes, 2 dof pan.
Tilt holds
down groove, collision switch mounting hole, can be added with sensors.
Elastic rubber tires. Damping, gripping, and wear-resisting.
Light weight, high strength and no deformation characteristics.
Unique design and color, cool feeling.

SainSmart L298N Dual H Bridge DC Motor Driver:
Driver: L298N Dual H Bridge DC Motor Driver IC
The terminal supply area of driven part Vs: +5 V ~ +35 V; such as the need to take power within the board, the supply area Vs: 7V ~ 35V
The peak current of driven part Io: 2A
The terminal supply of area the logical part Vss: +5 V ~ +7 V (can take power within the board +5 V)
The operating current range of the logical part : 0 ~ 36mA
control signal input voltage range:
Low:-0.3V ≤ Vin ≤ 1.5V
High: 2.3V ≤ Vin ≤ Vss

Enable signal input voltage range:
Low: -0.3 ≤ Vin ≤ 1.5V (control signal is invalid)
High: 2.3V ≤ Vin ≤ Vss (control signal active)
Maximum power consumption: 20W (when the temperature T = 75 °C)
Storage temperature: -25 °C ~ +130 °C
Driver Board Size: 55mm * 49mm * 33mm (with fixed copper pillar and the heat sink height)
Driver Board Weight: 33g
Other Extensions: control of direction indicators, the logic part of the plate to take power interface.

SainSmart Ultrasonic HC-SR04 Distance Sensor:
power supply :5V DC
quiescent current : <2mA
effectual angle: <15°
ranging distance : 2cm – 500 cm
resolution : 0.3 cm

1 、Carefully interpret the images and pay attention to installation order, in case of doubt can refer to the next installation diagram.

2. please be careful to use cell polarity.

Tools Required

1. Cross or Phillips Screwdriver (2mm and 4mm)
2. Needle nose pliers
3. Wire Cutters

4. Wire Strippers

Outline of Installation Steps

1. Mount the 4 DC Motors, 2 on each motor side plate, be sure the wiring lugs are exposed.
2. You will be cutting the red and black wire into two 4” Reds, two 4” Black, two 7” Reds, two 7” Black,
3. Wire up each of the 2 motors in parallel to each other. The poles of the motors need to criss-cross over from bottom to top from one to the other. You will need to cut the red and black wire in into 4” pieces, and strip the ends of each, and attach to the motor lugs. You can twist each wire on with your fingers and solder up the connections later.
4. You should have a 14” black and red wire, cut each into half, creating two 7” wires and two 7” black wires, and strip all the ends.
5. Use the 6AA Battery pack to test each pair of motors.
6. You should have between 6 volts to 9 volts out of the battery pack.
7. Attach the wheels and verify that both motors on the plate spin in the same direction. Repeat for the second set of motors.
8. Attach the bottom plate to both motor plates.
9. Attach the Battery pack inside the bottom plate with AA batteries parallel to the motor plates.
10. Attach the front and rear end plates.
11. Attach the Motor Drive board to the bottom plate using the 4 long screws, nuts, and tube extensions.
12. Optional: Attach the ON/OFF switch and the External Battery(charging jack) to the top plate.
13. Driver Motor Board: use a small phillips to loosen up all the wire screw connections and remove the two jumpers between the ENA/5V and ENB/5V.
14. Wire up the motors to the motor driver.
    - 14.(a) Left black to Out1, The negative pole connects to OUT1 port
    - 14.(b) red to Out 2, The positive pole connects OUT2 port;
    - 14.(c)Right black to Out4, The negative pole connects to OUT4 port

14.(d) red to Out3, The positive pole connects to OUT3 port.

15. Wire up the 6AA battery pack to the motor driver. The black wire to the GND and the Red wire to the VCC of the motor driver. Press the blue button and the motor driver led should turn on and off. Verify that led stays on Solid with all the wires firmly connected to the driver.

16.Attach 6 Male to Male M/M wires to the Motor Driver

16.1. Red to IN1

16.2. Yellow to IN2

16.3. Green to IN3

16.4. Black to IN4

16.5. Yellow to ENA

16.6. Blue to ENB

17. Attach Power Red/Black. Cut or attach using M/F jumpers.

17.1.Red to 5V

17.2. Black to GND (second wire. Battery should remain attached.

18.Optional: Wire in ON/OFF switch. (connect Wht/Blk/Brn wire to switch), Red wire from Battery to center black. White wire to 5V on Motor driver; Black

19.Pull all the wires through the top plate. And fasten the top plate.

20.Using a screw driver, power up the motor driver by pressing the blue button.

21.Attach the Sainsmart Sensor Shield to the Arduino UNO.

22.Mount the Sensor Shield and Arduino UNO to the top plate. Face the USB port towards the rear to allow connection to your computer.

23.Connect the power Red/Black to POWER on the Sensor Shield, 5V Red, Black to GND. With the led on the motor driver, the led on the sensor shield should be lit.

24. Wire up the Motor Driver to the Sensor Shield.

24.1. Brown IN1 to S (7)

24.2. Yellow IN2 to S (6)

24.3. Purple IN3 to S (4)

24.4. Blue IN4 to S (2)

24.5. Green ENA to S (5)

24.6. Org ENB to S (3)

25.Mount the Servo.

26. Wire the Servo to the Shield. BRN to GND, RED to V, ORG to S (9).

27. Mount the HC-SR04 Sensor.

28. Wire the HC-SR04 to the Sensor Shield.

28.1.5V, Red, Echo (11) Green, Trigger S(12) Yellow, GND. Black

29. Add a 9V battery to power the Arduino UNO.

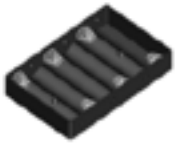
30. Power UP. Load the 4WDRobot_Motor_Test01.ino sketch and test.

Bill of Materials for Sainsmart 4WD Robot

Each SKU:20-011-C55 Kit needs additional:
1 SG90 Servo
6 AA Batteries
1 9V Battery
1 Battery Clip 4.72" 12cm Male DC Plug 2.1 X 5.5mm 9V
8 40mm x 1/2” Screws and washers
10 M/M Wire Jumpers
2 F/F Wire Jumpers
1 Servo Mount for HC-SR04, http://www.thingiverse.com/thing:100486

HookUp Wire
1 F/F red, 1F/F black (power)
1 M/M red, 1 M/M black, 1 M/M yell, 1 M/M Grn (HC-SR04
1 M/M Yell, 12 M/M Org, 1 M/M blu, 1 M/M Grn, 1 M/M Brn, 1 M/M Purple (Motor Driver)

the parts list

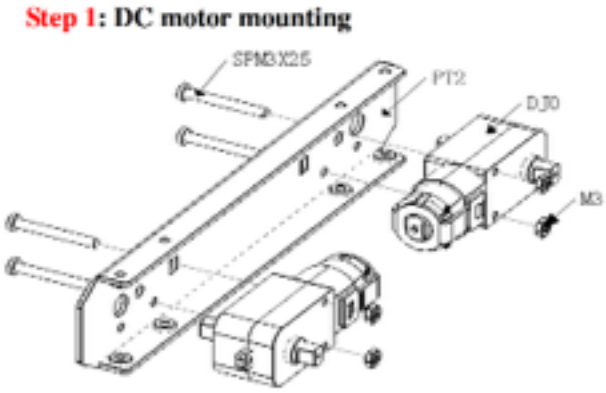
Name (number)	Code	Icon	Name (number)	Code	Icon
The platform plate (1)	PT0		Platform plate (1)		
Platform side (2)	PT2		Platform end plate (2)	PT3	
Toggle switch (1)	KG0		Charging interface (1)	CD0	
DC motor (4)	DJ0		Power supply box (1)	DY0	
Wheel (4)	CL0				

(二) connecting parts list

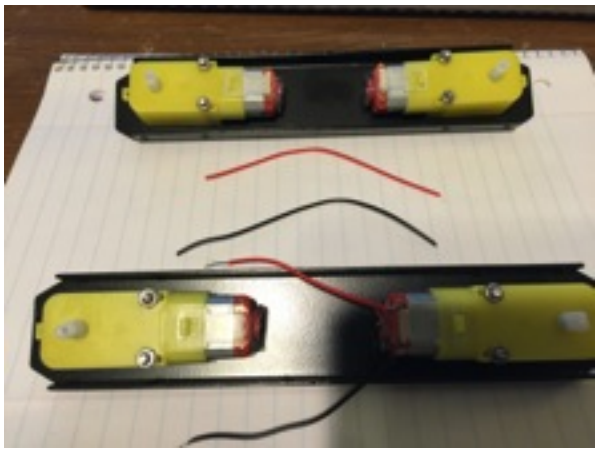
SN	Name	Code	Icon	Specification and description
1	Cruciform slot screw	SPM3×6		24 个 M3×6
2	Cruciform slot screw	SPM3×25		8 个 M3×25
3	Six corner	LM3		16 个 M3
4	Elastic washer	DQ1		1 for the M6 thread parts
5	Check washer	DQ2		1 for the M6 thread parts
6	Elastic washer	DQ3		1 for the M8 thread parts
7	Six corner	LM6		1 for the M6 thread parts

Installation Steps Illustrated

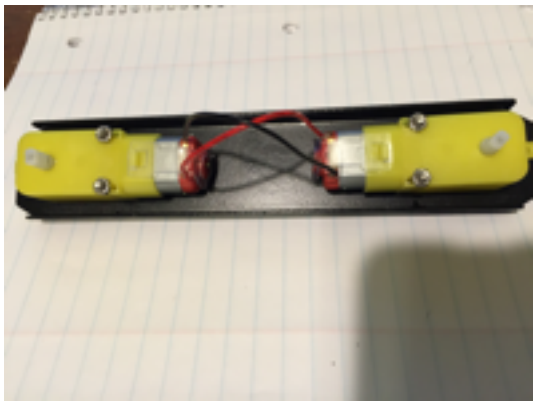
1. Step 1. Mount the 4 DC Motors, 2 on each motor side plate, be sure the wiring lugs are exposed.

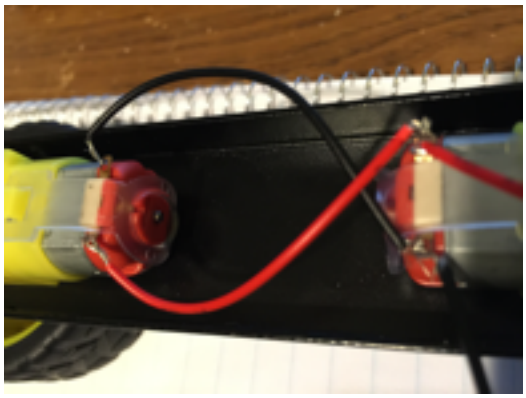


2. You will be cutting the red and black wire into two 4” Reds, two 4” Black, two 7” Reds, two 7” Black.

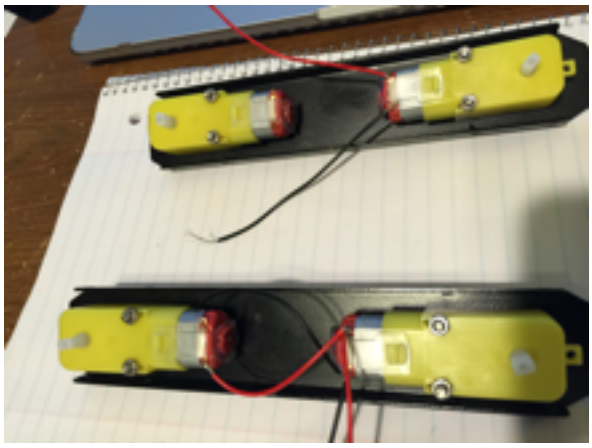


3. Wire up each of the 2 motors in parallel to each other. The poles of the motors need to criss-cross over from bottom to top from one to the other. You will need to cut the red and black wire in into 4” pieces, and strip the ends of each, and attach to the motor lugs. You can twist each wire on with your fingers and solder up the connections later.

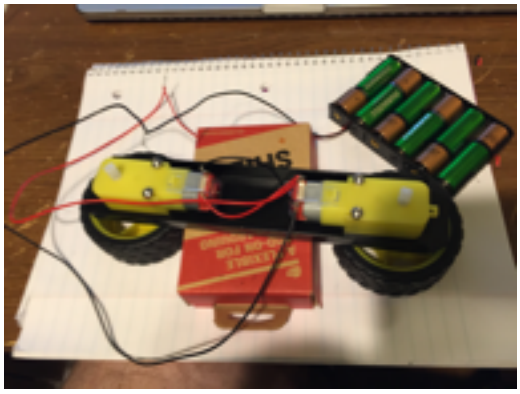




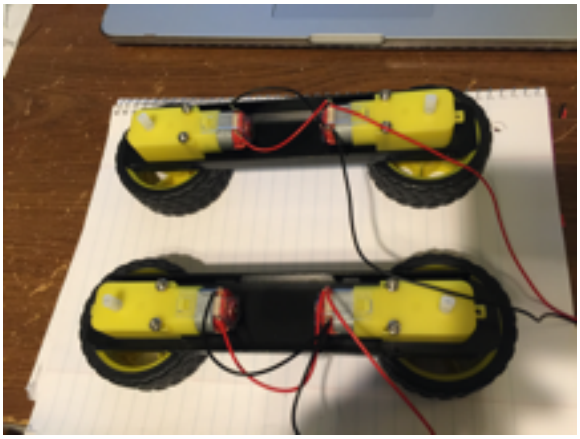
4. You should have a 14” black and red wire, cut each into half, creating two 7” [red] wires and two 7” black wires, and strip all the ends. [Attach these to the lugs with the same color wire from step 3 for one motor from each assembly.]

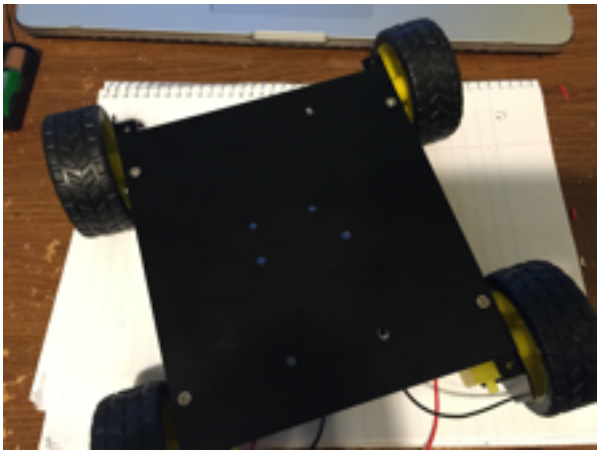


5. Use the 6AA Battery pack to test both pairs of motors.
6. You should have 9 volts out of a battery pack containing new AA batteries.

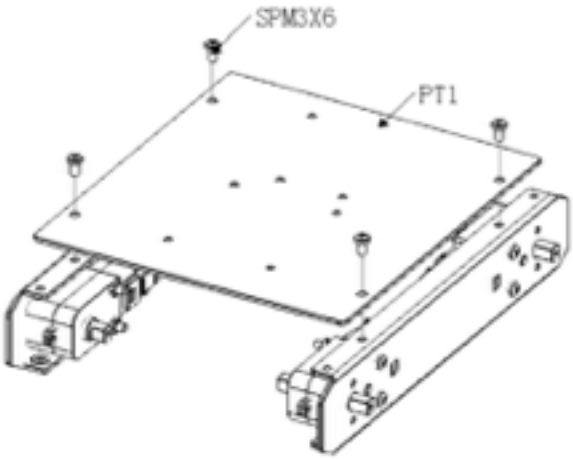


7. Attach the wheels and verify that both motors on the [side] spin in the same direction. Repeat for the second set of motors.!
    a. The right-front wheel's lead should be like this: The negative pole is above while the positive pole is below. The negative pole should be connected with OUT1 port while the positive pole should be connected with OUT2 port; The rear-right wheel's lead should be like this: The negative pole is above while the positive pole is below. The negative pole should be connected with OUT2 while the positive pole should be connected with the OUT1 port.
    The left-front wheel's lead should be like this: The positive pole is above while the negative pole is below. The negative pole should be connected with OUT4 port while the positive pole should be connected with OUT3 port. The left-rear wheel's lead should be like this: The positive pole is above while the negative pole is below. The negative pole should be connected with OUT3 port while the positive pole should be connected with OUT4 port.

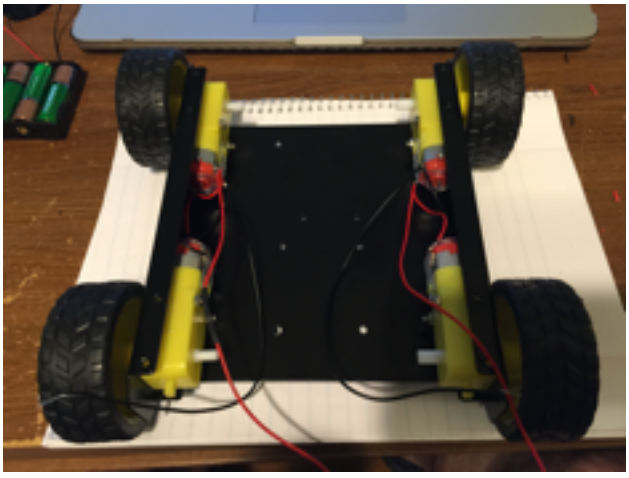


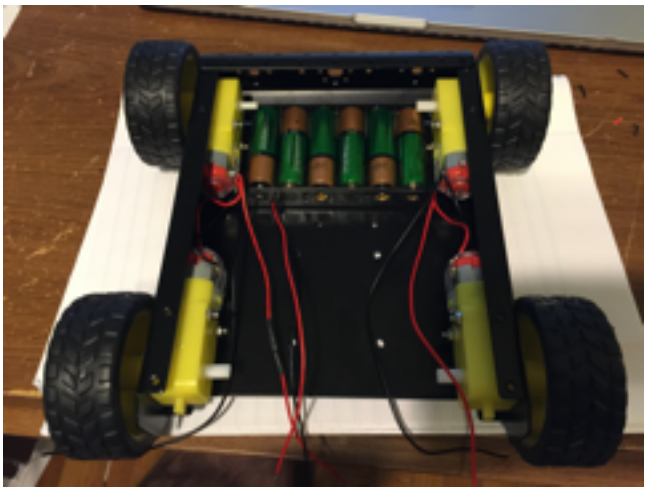


Step 2 Side and the lower plate installation



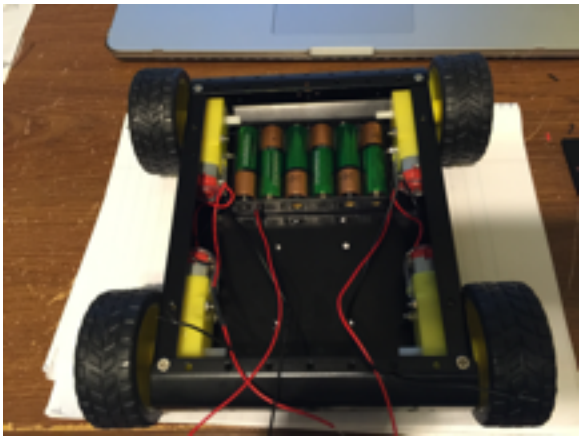
8. Attach the bottom plate to both motor plates. [If the holes on the side plate are too large for the screws, use an extra nut or wedge a short length of wire in the hold for the screw to bind to.]

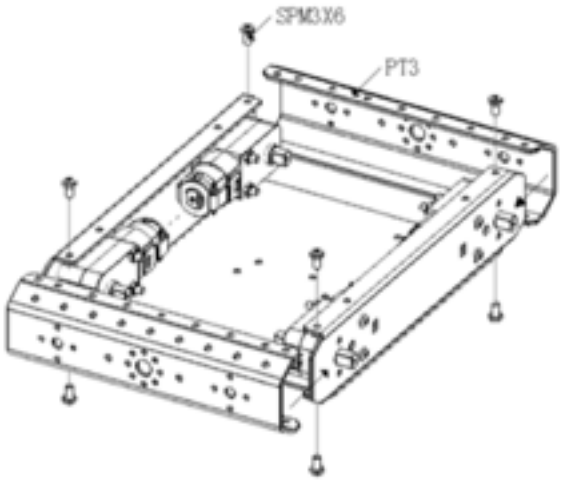




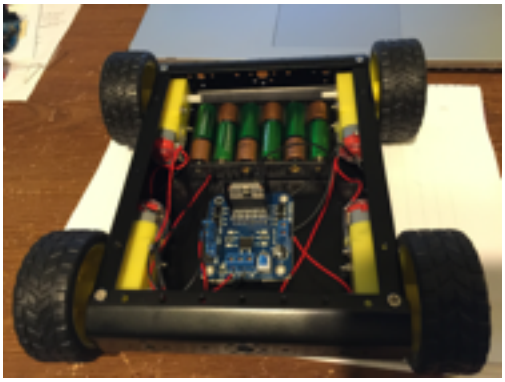
9. Attach the Battery pack inside the bottom plate with AA batteries parallel to the motor plates. [Use double sided tape.]

10. Attach the front and rear end plates.

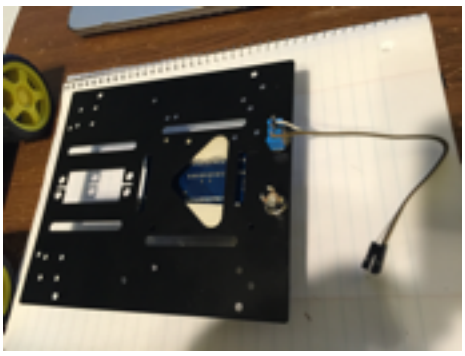


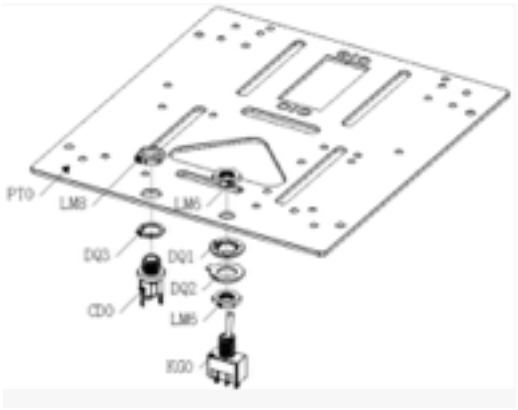


11. Attach the Motor Drive board to the bottom plate using the 40mm x 1/2” Screws and washers screws, nuts, and tube extensions.! [Use double sided tape to prevent contact with the bottom plate if your kit doesn't include tube extensions]



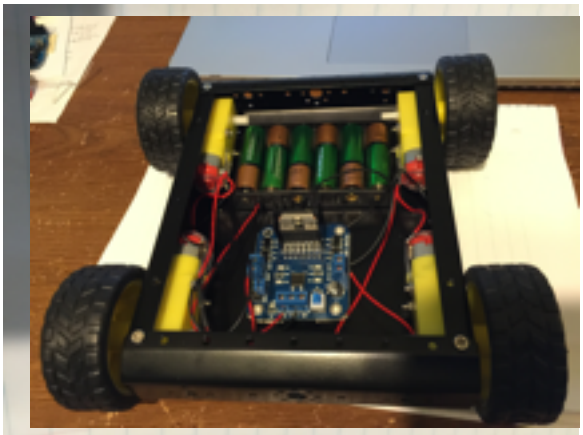
12. Optional: Attach the ON/OFF switch and the External Battery(charging jack) to the top plate.
13. Optional: Wire in ON/OFF switch. (connect Wht/Blk/Brn wire to switch), Red wire from Battery to center black. White wire to 5V on Motor driver; Black

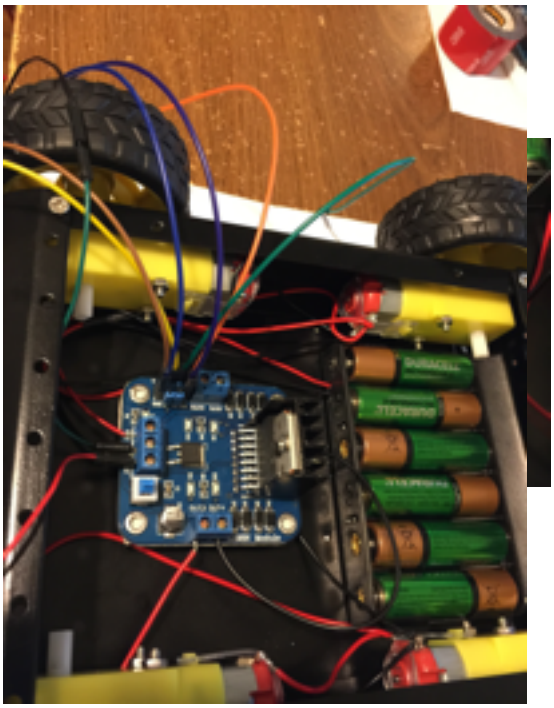




14. Driver Motor Board: use a small phillips to loosen up all the wire screw connections. [Remove the two jumpers between the ENA/5V and ENB/5V - you can replace them edgewise on the two middle pins between the ENA and ENB pins.]

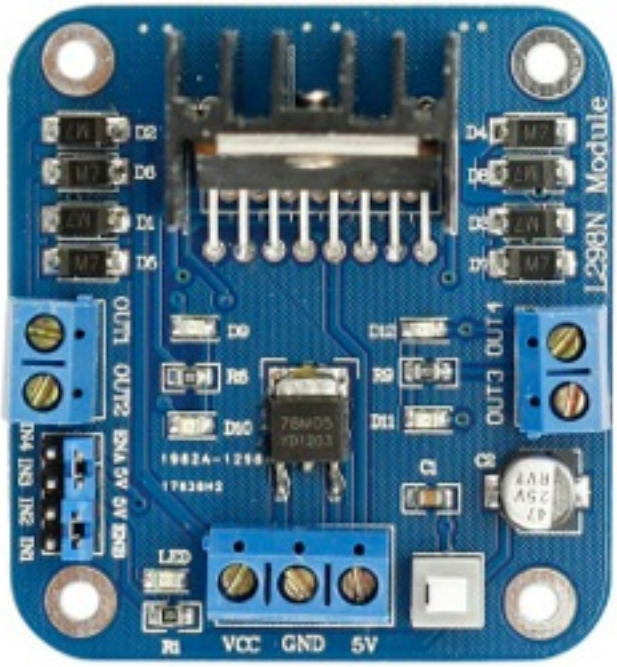
15. Wire up the motors to the motor driver.
    15.(a) Left black to Out1, The negative pole connects to OUT1 port
    15.(b) red to Out 2, The positive pole connects OUT2 port;
    15.(c)Right black to Out4, The negative pole connects to OUT4 port
    15.(d) red to Out3, The positive pole connects to OUT3 port.

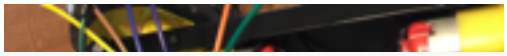




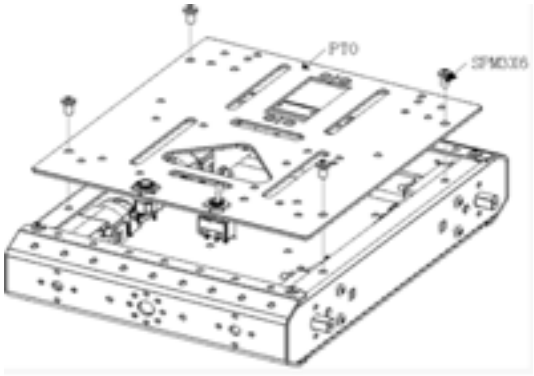
16. Wire up the 6AA battery pack to the motor driver. The black wire to the GND and the Red wire to the VCC of the motor driver [wire screw connections]. Press the blue
button and the motor driver led should turn on and off. Verify that led stays on Solid with all the wires firmly connected to the driver. !

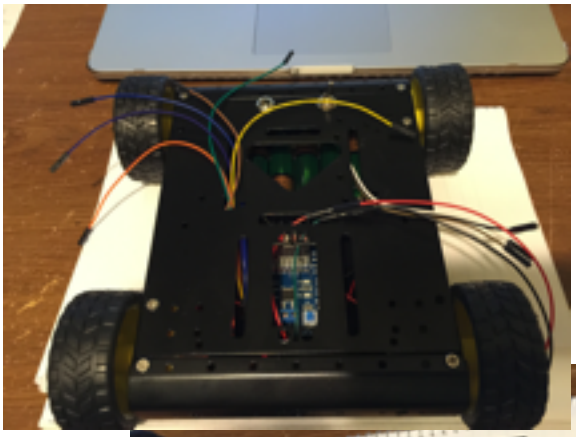
17. Attach 6 Male to Male M/M wires to the Motor Driver
    17.1. Red to IN1
    17.2. Yellow to IN2
    17.3. Green to IN3
    17.4. Black to IN4
    17.5. Yellow to ENA
    17.6. Blue to ENB

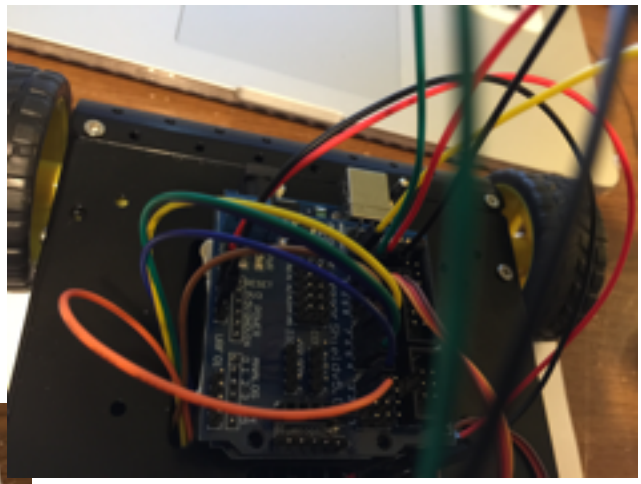


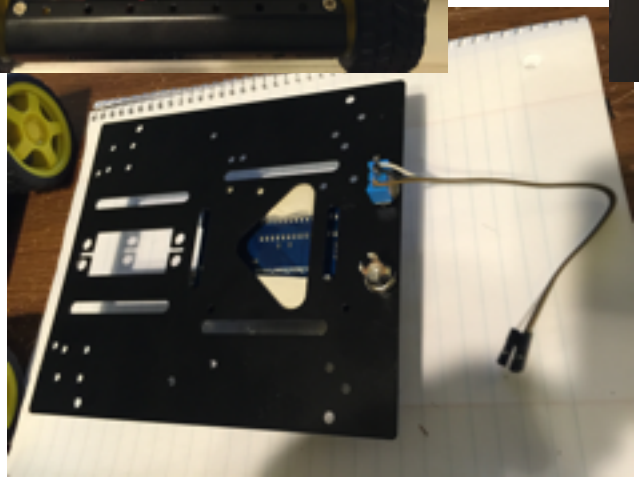



CL0


PT0
SPMD3X6



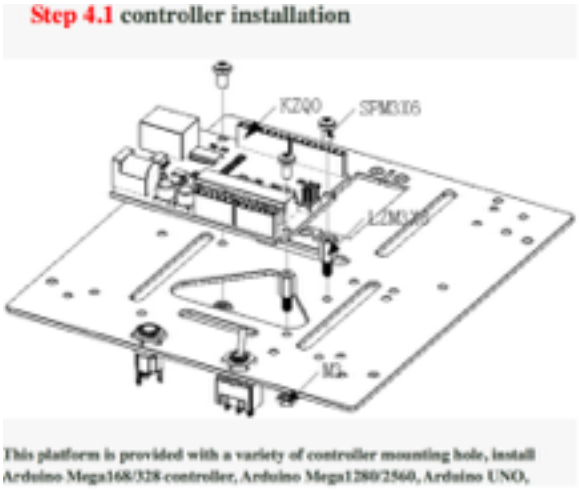




18. [Attach a red M/F jumper wire to the 5V wire screw connector. Attach a black M/F jumper wire to the GND wire screw connector - twist the black wire from the battery pack around the male jumper pin if necessary to to get both wires to hold under the screw]
    18.1.Red to 5V
    18.2. Black to GND (second wire. Battery should remain attached.

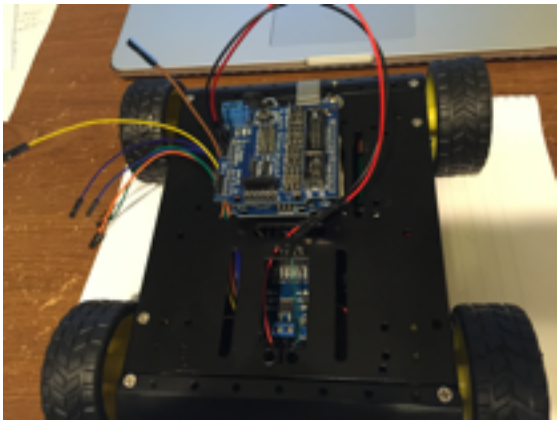
19.Pull all the wires through the top plate. And fasten the top plate.

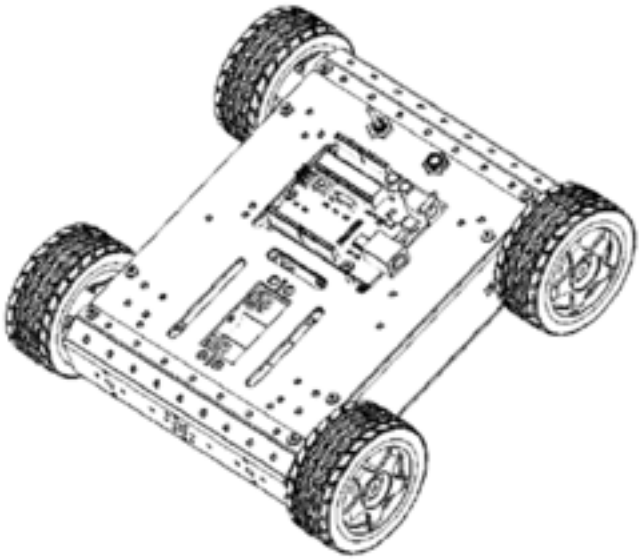
20.Using a screw driver, power up the motor driver by pressing the blue



    button.
21.Attach the Sainsmart Sensor Shield to the Arduino UNO.

22.Mount the Sensor Shield and Arduino UNO to the top plate. Face the USB port towards the rear to allow connection to your computer.



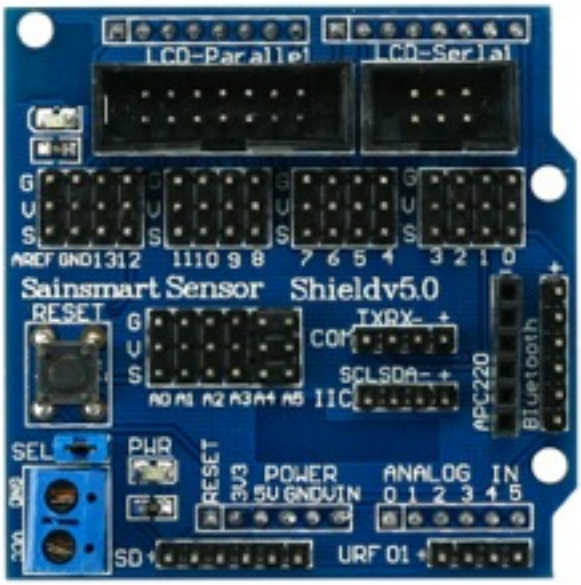


23.Connect the power Red/Black to POWER on the Sensor Shield, 5V Red, Black to GND. With the led on the motor driver, the led on the sensor shield should be lit.

24. Wire up the Motor Driver to the Sensor Shield.
    24.1.Brown IN1 to S (7)
    24.2. Yellow IN2 to S (6)
    24.3. Purple IN3 to S (4)
    24.4. Blue IN4 to S (2)
    24.5. Green ENA to S (5)
    24.6. Org ENB to S (3)

25.Mount the Servo. [the holes in the servo mount may need to be drilled out to allow the screws to attach securely to the servo arm.] or you can simply use double stick tape and mount the servo arm to the Servo

Mount. Before mounting the servo arm, you should power up the servo and get it to position degree 0.

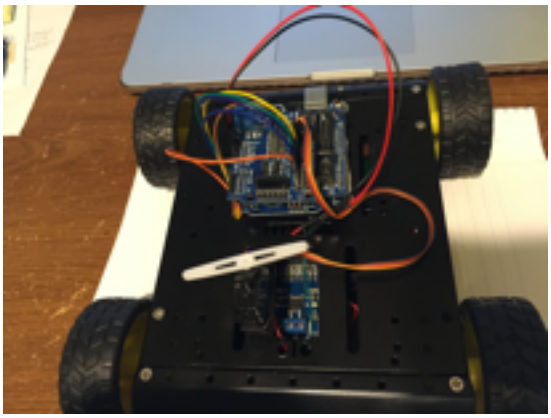


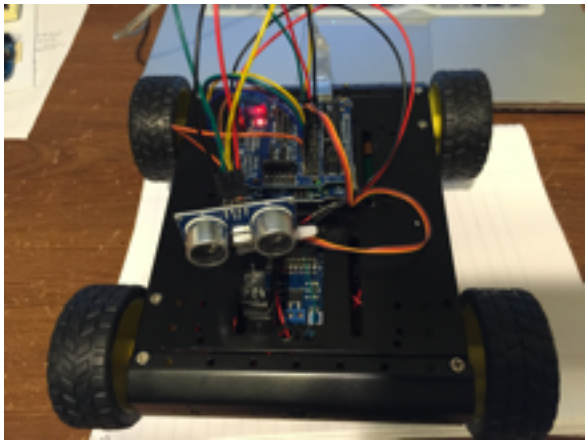
Servo Mount for HC-SR04

Thingverse stl file @ http://www.thingiverse.com/thing:100486

26. Wire the Servo to the Shield. BRN to GND, RED to V, ORG to S (9).
27. Mount the HC-SR04 Sensor.
28. Wi Wire the HC-SR04 to the Sensor Shield.
    [28.1.5V, Red
    28.2.Echo (11) Green

28.3 Trigger S(12) Yellow
28.4 GND, Black!]





29. Add a 9V battery to power the Arduino UNO.

30. Power UP. Load the 4WDRobot_Motor_Test01.ino sketch and use the Serial Monitor to test.