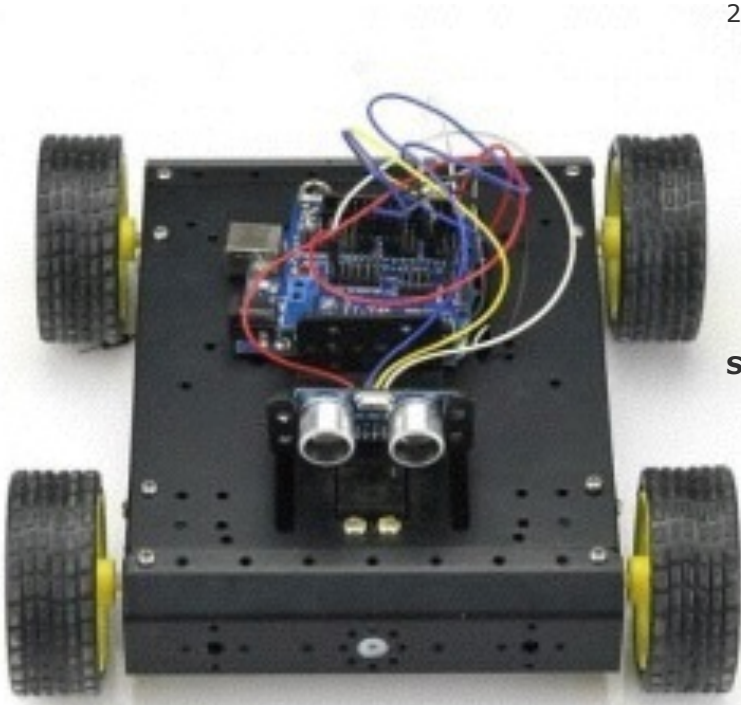


4WD mobile robot platform

Installation manual v1.0

by Glenn Mossy, Dec 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: $-0.3V \leq V_{in} \leq 1.5V$

High: $2.3V \leq V_{in} \leq V_{ss}$

Enable signal input voltage range:

Low: $-0.3 \leq V_{in} \leq 1.5V$ (control signal is invalid)

High: $2.3V \leq V_{in} \leq V_{ss}$ (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

The assembly steps **Matters needing attention:**

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, 1 F/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

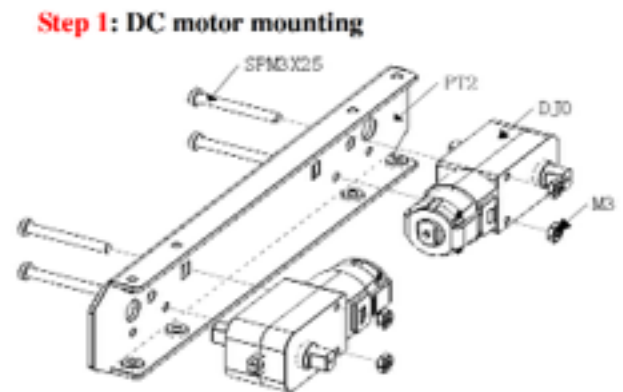
Name (number)	Code	Icon	Name (number)	Code	Icon
The platform plate (1)	PT0		Platform plate (1)		
Platform side (2)	PT2		Platform end plate (2)	PT3	
Toggle switch (1)	KG0		Charging interface (1)	CD0	
DC motor (4)	DJ0		Power supply box (1)	DY0	
Wheel (4)	CL0				

(二) connecting parts list

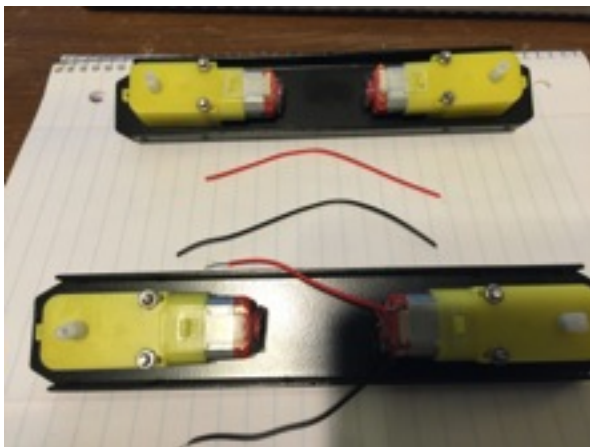
SN	Name	Code	Icon	Specification and description
1	Cruciform slot screw	SPM3×6		24 个 M3×6
2	Cruciform slot screw	SPM3×25		8 个 M3×25
3	Six corner	LM3		16 个 M3
4	Elastic washer	DQ1		1 for the M6 thread parts
5	Check washer	DQ2		1 for the M6 thread parts
6	Elastic washer	DQ3		1 for the M8 thread parts
7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

Installation Steps Illustrated

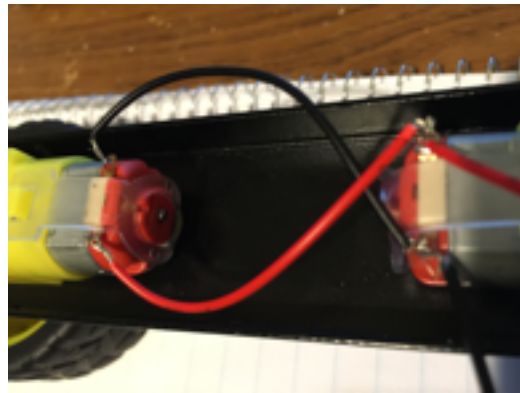
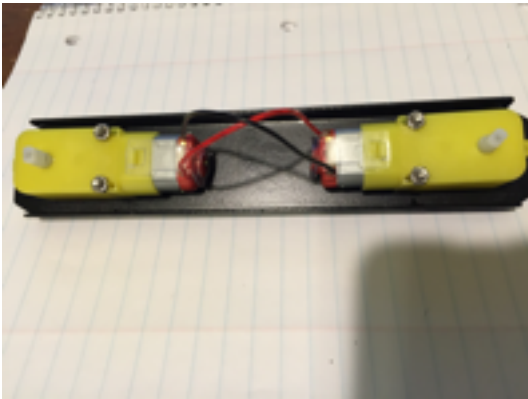
1. Mount the 4 DC Motors, 2 on each motor side plate, be sure the wiring lugs are exposed.



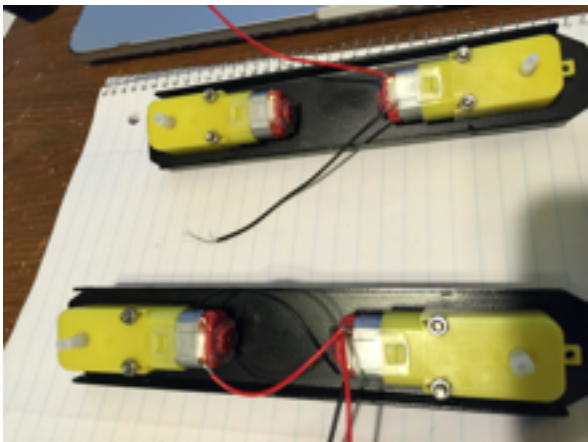
2. You will be cutting the red and black wire into two 4" Reds, two 4" Black, two 7" Reds, two 7" Black.



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.



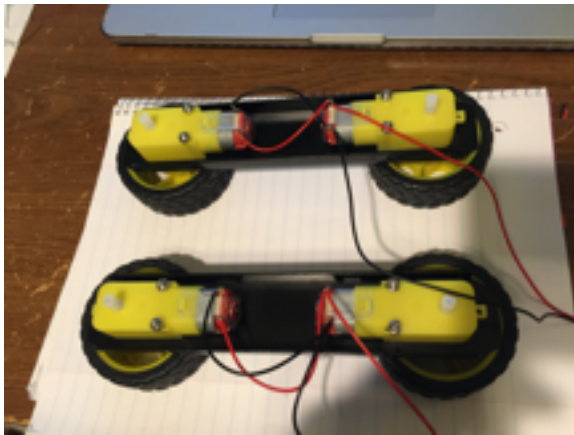
4. You should have a 14" black and red wire, cut each into half, creating two 7" wires and two 7" black wires, and strip all the ends.



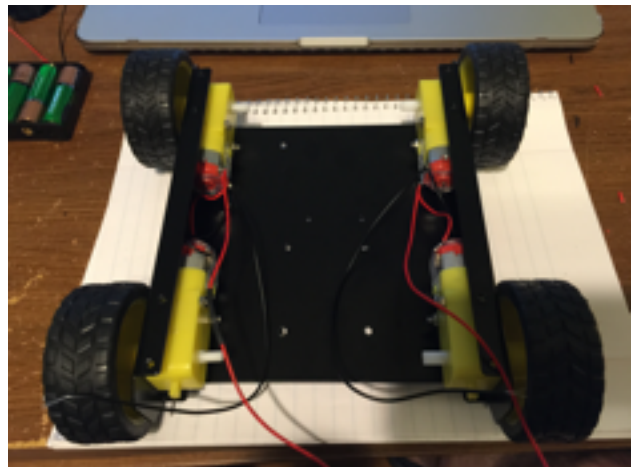
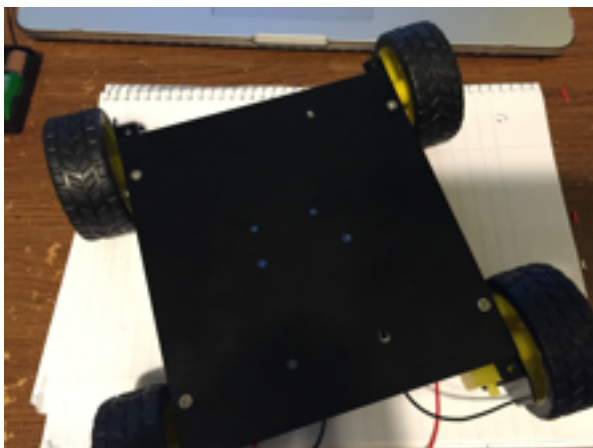
5. Use the 6AA Battery pack to test each pair of motors.
6. You should have between 6 volts to 9 volts out of the battery pack.



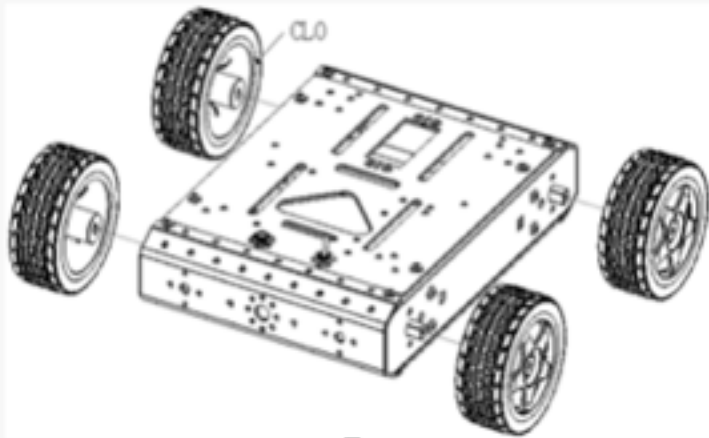
7. Attach the wheels and verify that both motors on the plate spin in the same direction. Repeat for the second set of motors.



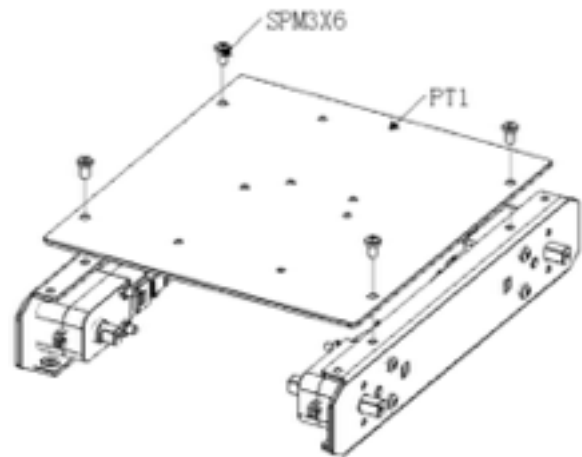
8. Attach the bottom plate to both motor plates.



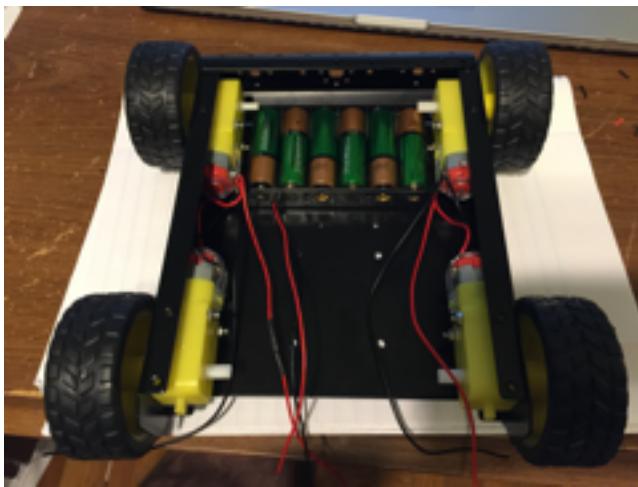
Step 6 wheel mounting



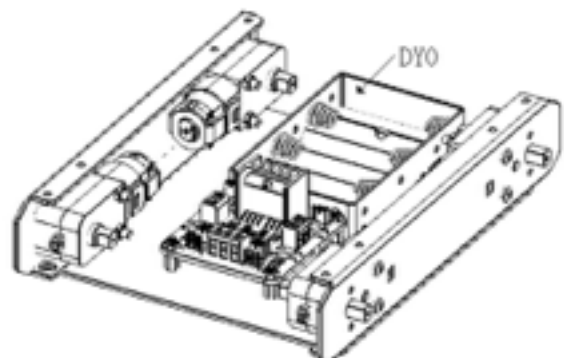
Step 2 Side and the lower plate installation



9. Attach the Battery pack inside the bottom plate with AA batteries parallel to the motor plates.

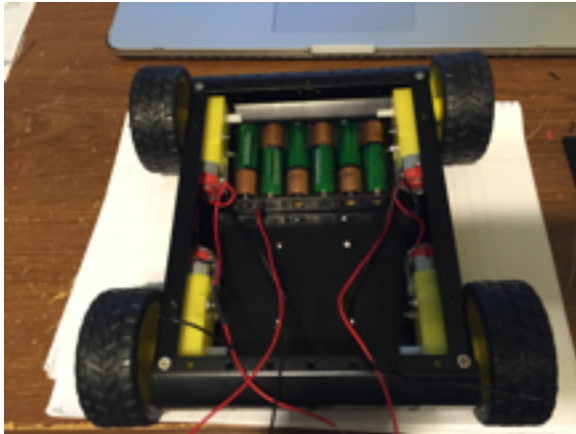


Step 2.2 are arranged in the battery box

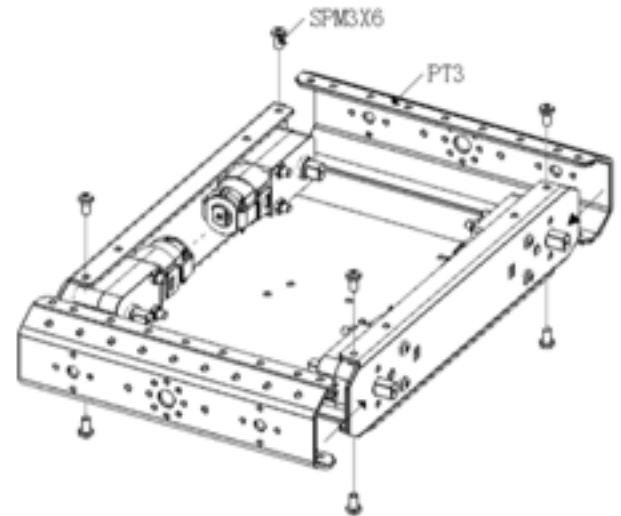


The battery box can be double-sided glue fixed, rear wheel motor wiring need

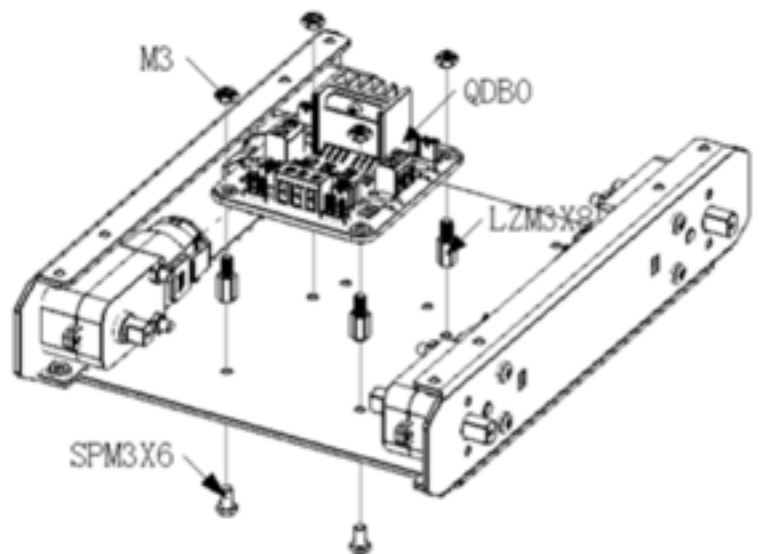
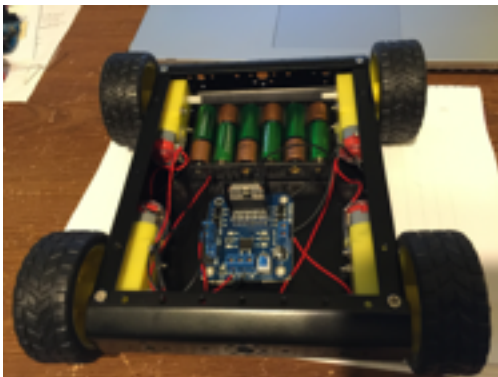
10. Attach the front and rear end plates.



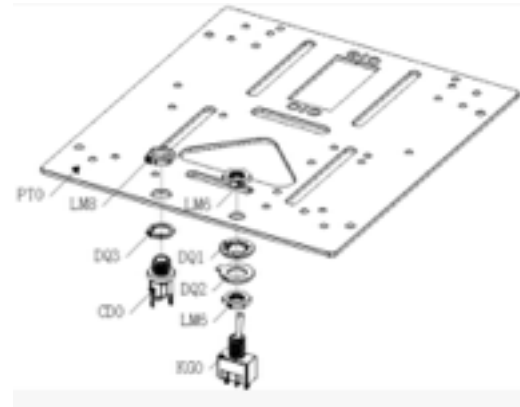
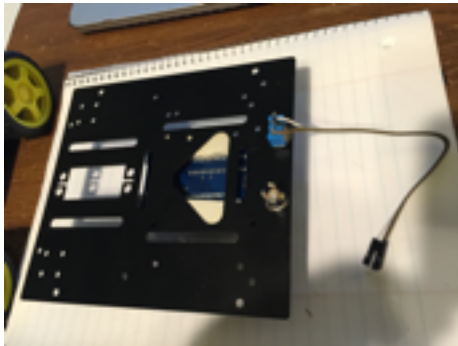
Step 3 end plate installation



11. Attach the Motor Drive board to the bottom plate using the 40mm x 1/2" Screws and washers 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.

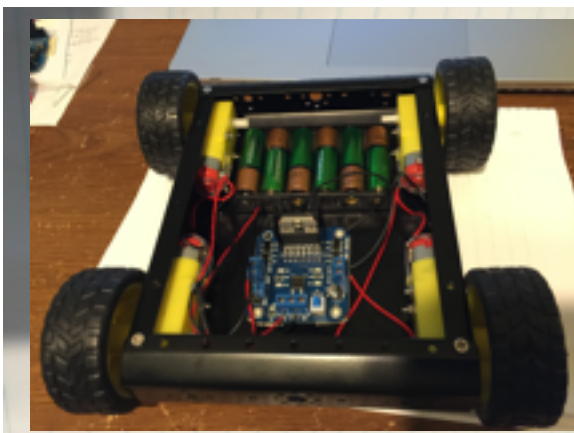
14. Wire up the motors to the motor driver.

14.(a) Left black to Out1, The negative pole connects to OUT1 port

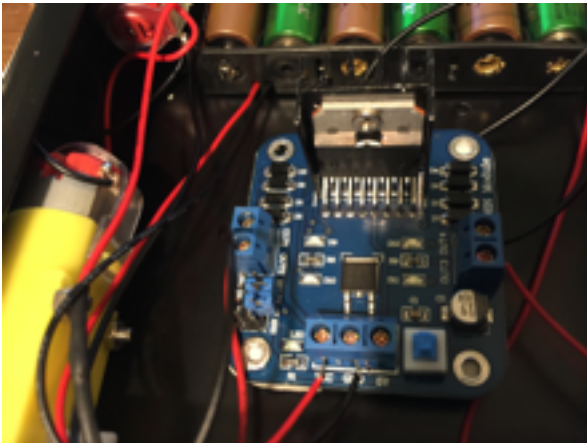
14.(b) red to Out 2, The positive pole connects OUT2 port;

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.

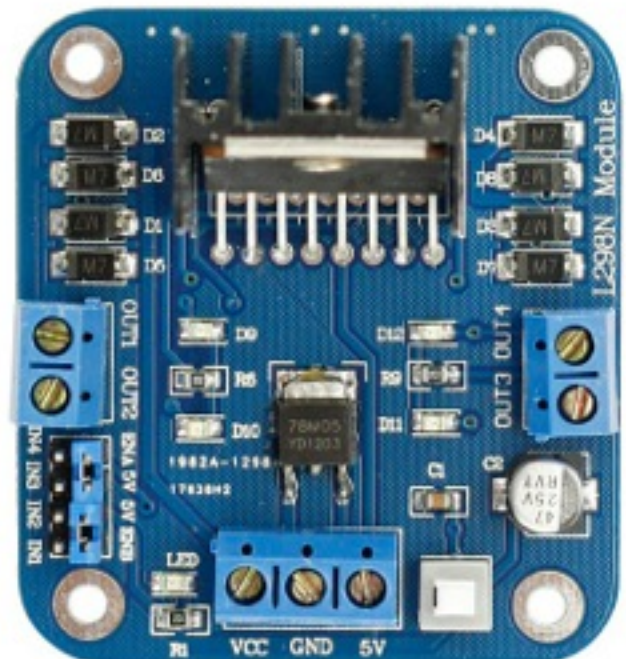


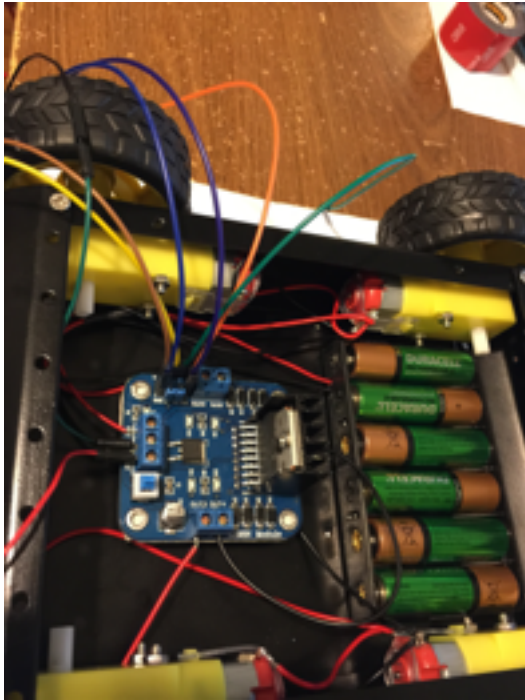
15. Wire up the 6AA battery pack to the motor driver. The black wire to the GND and the Red wire to the VCC of the motor driver. Press the blue button and the motor driver led should turn on and off. Verify that led stays on Solid with all the wires firmly connected to the driver.



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

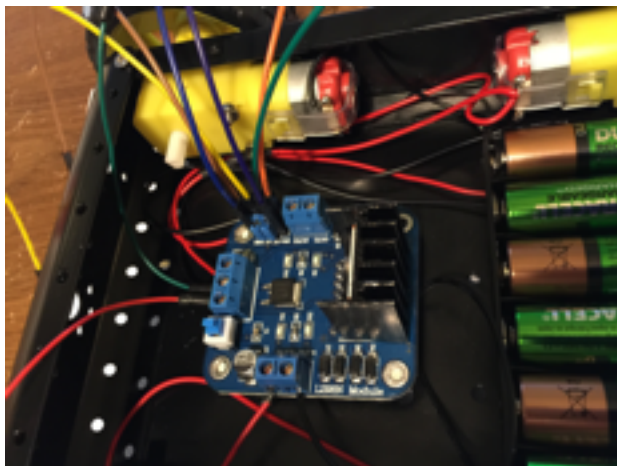




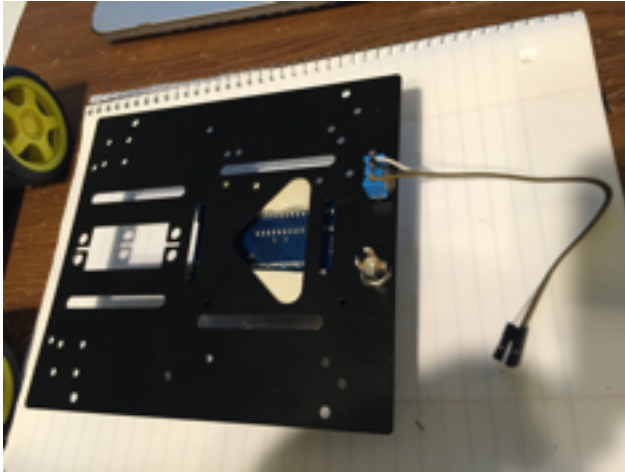
17. Attach Power Red/Black. Cut or attach using M/F jumpers.

17.1.Red to 5V

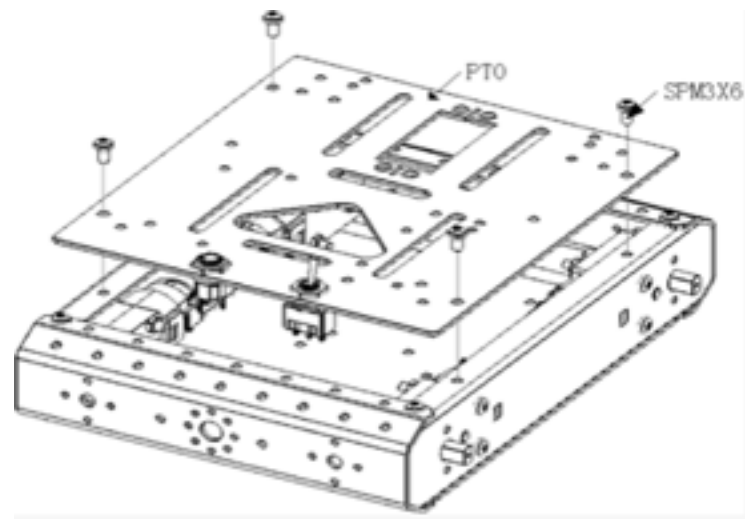
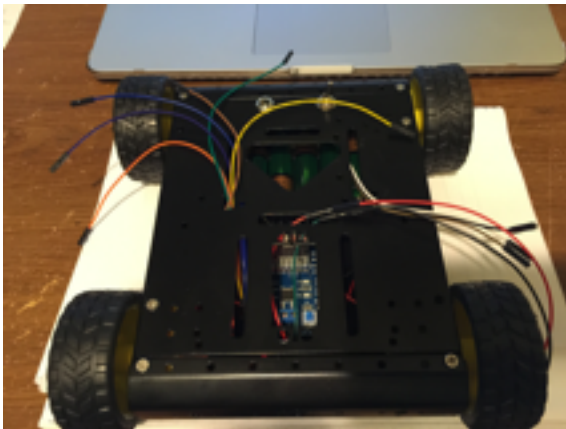
17.2. Black to GND (second wire. Battery should remain attached).



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



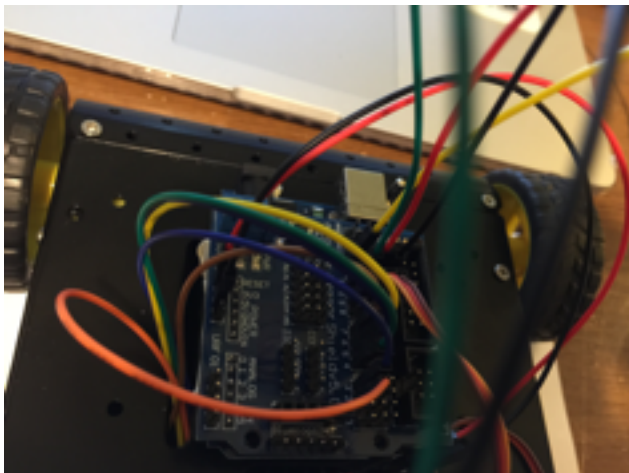
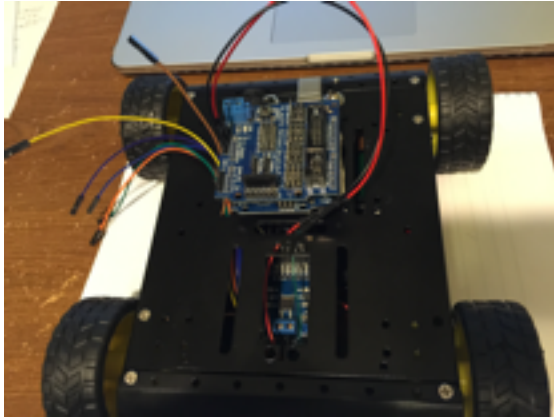
19. Pull all the wires through the top plate. And fasten the top plate.



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)

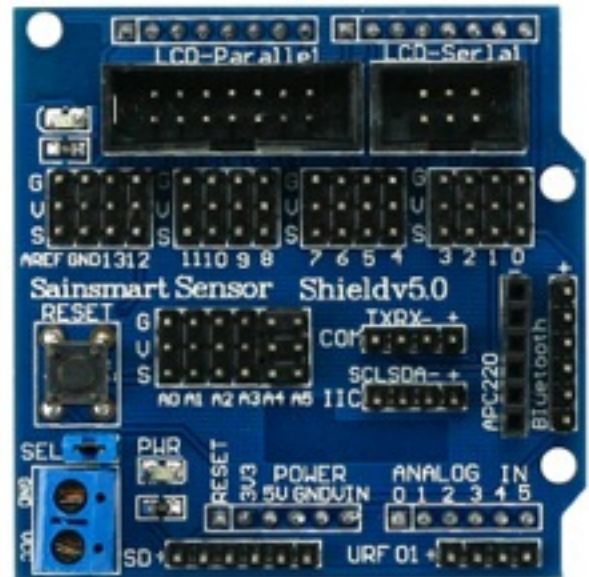
24.2. Yellow IN2 to S (6)

24.3. Purple IN3 to S (4)

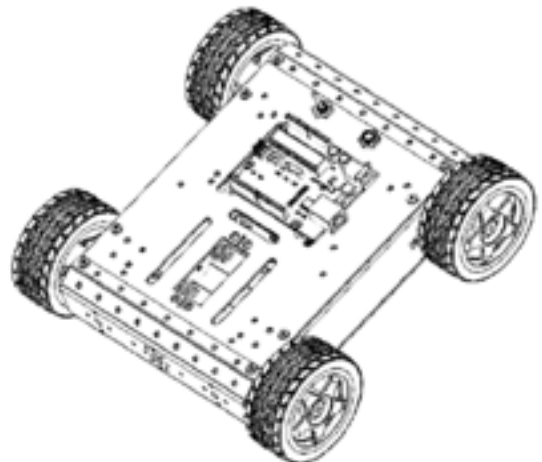
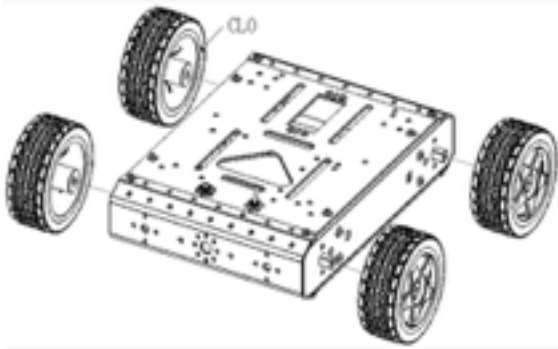
24.4. Blue IN4 to S (2)

24.5. Green ENA to S (5)

24.6. Org ENB to S (3)



Step 6 wheel mounting



25. Mount the Servo.

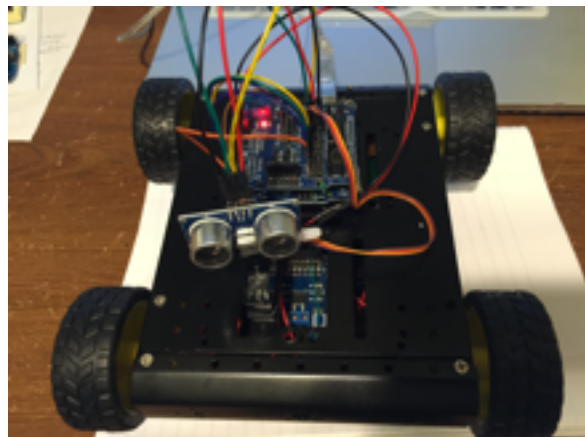
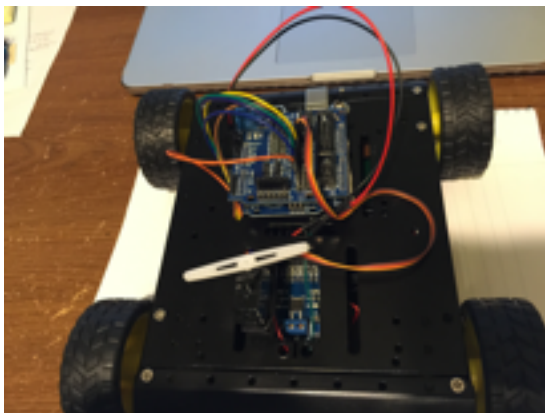
Servo Mount for HC-SR04 Thingiverse stl file @ <http://www.thingiverse.com/thing:100486>



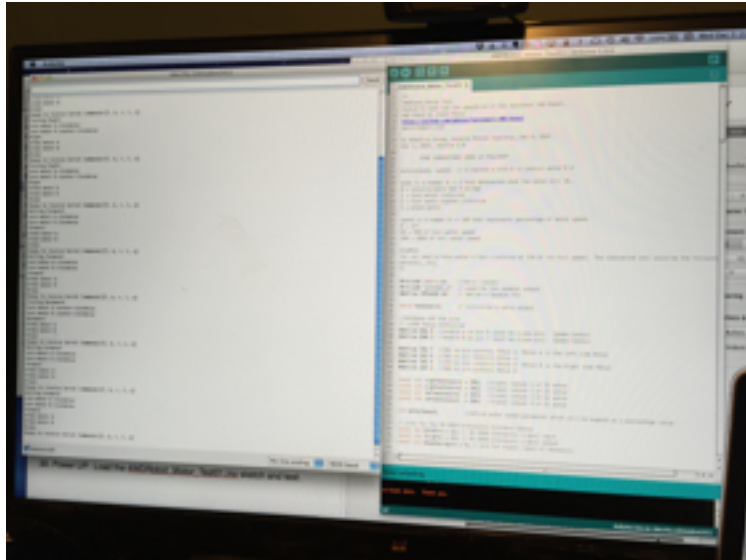
26. Wire the Servo to the Shield. BRN to GND, RED to V, ORG to S (9).

27. Mount the HC-SR04 Sensor.

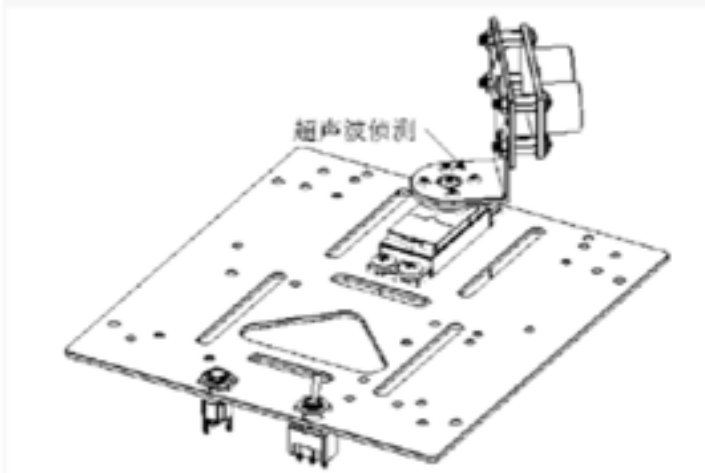
28. Wire the HC-SR04 to the Sensor Shield.



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 use the Serial Monitor to test.



Step 4.4 rotary ultrasonic detection installation (Extended)



Note: before installing the servo steering gear, through the servo controller, Arduino controller to the median (0 degree position)