

D2-5 Intelligent Tracking Car DIY Kit

1.Introduction:

There is a 16 mm wide black runway in the white field.Our tracking car can drive along the black runway automatically.No matter how the runway is bent, the car can be driven automatically.

We all know that the reflectivity is different when the light source to the white objects and black objects.Here we use red light source.The light is reflected through the ground to the photoresistor. By detecting the Resistor of the photosensitive resistor can determine whether the car is driving in the white area.If the detection is black runway, then the car to change the direction of driving and motor will slow down or even stop and Red LED OFF on PCB front side.Drive the car in the opposite direction so that the car is always running along the runway.

2.Feature:

- 1>.Automatic tracing motion
- 2>.Automatic intelligent control
- 3>.Circuit/mechanical/sensor professional training
- 4>.Enhance the principle of theory and Practice
- 5>.DIY manual soldering

3.Parameter:

- 1>.Product Name:D2-5 Intelligent Tracking Car DIY Kit
- 2>.Work Voltage:DC 3.0V
- 3>.Work Temperature:-40℃~85℃
- 4>.Work Humidity:5%~95%RH
- 5>.Size(Installed):104*72*55mm

4.Use Method:

1>.Insert two AA batteries (not included) in the battery holder, being sure to put them so the flat end of each batter is touching the spring in the holder.

2>.Turn ON switch.It is OK if 2pcs Red LED turn ON.Otherwise, the red LED may be installed incorrectly.

3>.The connection sequence of the motor wires needs to be exchanged if the rotation direction of the motor is wrong.

4>.The adjusting potentiometer is used to change detection distance of photosensitive sensor. Them need to be adjusted if the smart car can't move normally along the black guide rail.

5>.Step : If the robot does not track the line very well, make small adjustments to the trimpots and then retest the line following. You can improve the ability of the car to follow the line by repeatedly testing and adjusting the pots by small amounts.To make it line follow, what you did was set it on its back where the motors could turn but not move the robot, and then adjust one potentiometer until when put your finger over the sensor it would stop turning and when left exposed that side would turn. Then did the opposite on the other side, and was able to put it on the track provided on the sheet.

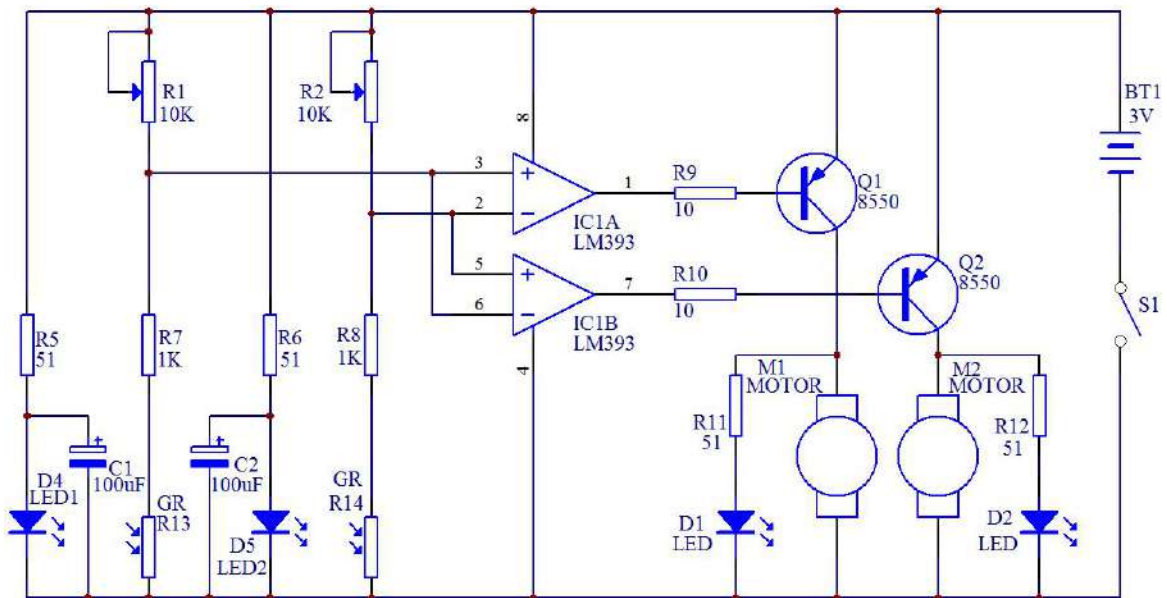
5.Component Listing:

NO.	Component Name	PCB Marker	Parameter	QTY
1	LM393	IC1	DIP-8	1
2	IC Socket	IC1	DIP-8	1
3	Electrolytic Capacitor	C1,C2	100uF	2
4	Potentiometer	R1,R2	103 10K	2
5	Metal Film Resistor	R5,R6,R11,R12	51ohm	4
6	Metal Film Resistor	R7,R8	1K	2

7	Metal Film Resistor	R9,R10	10ohm	2
8	Photoresistor	R13,R14	CDS5	2
9	Red LED	D1,D2	5mm	2
10	White LED	D4,D5	5mm	2
11	S8550 Transistor	Q1,Q2	TO-92	2
12	Self-Locking switch	S1	6*6mm	1
13	DC Motor	M1,M2	JD3-100	2
14	Wheel	/	24mm	2
15	Tires	/	24mm	2
16	Axle	/	D2*30mm	2
17	Plastic Spacer	/	D2.0mm	6
18	Three-way sleeve	/	D2.5mm	4
19	Gear	/	D22mm	2
20	Worm	/	D5mm	2
21	Screw	/	D2.2*8mm	4
22	Motor Screw(Black)	/	D1.7*4mm	4
23	Screw	/	M5*20mm	1
24	Nut	/	M5	1
25	Acorn Nut	/	M5	1
26	Cable	/	6cm	4
27	Battery Case(With adhesive)	/	AA*2	1
28	PCB	/	104*72mm	1

Note:Users can complete the installation according to the PCB silk screen and component list.

6.Schematic Diagram:



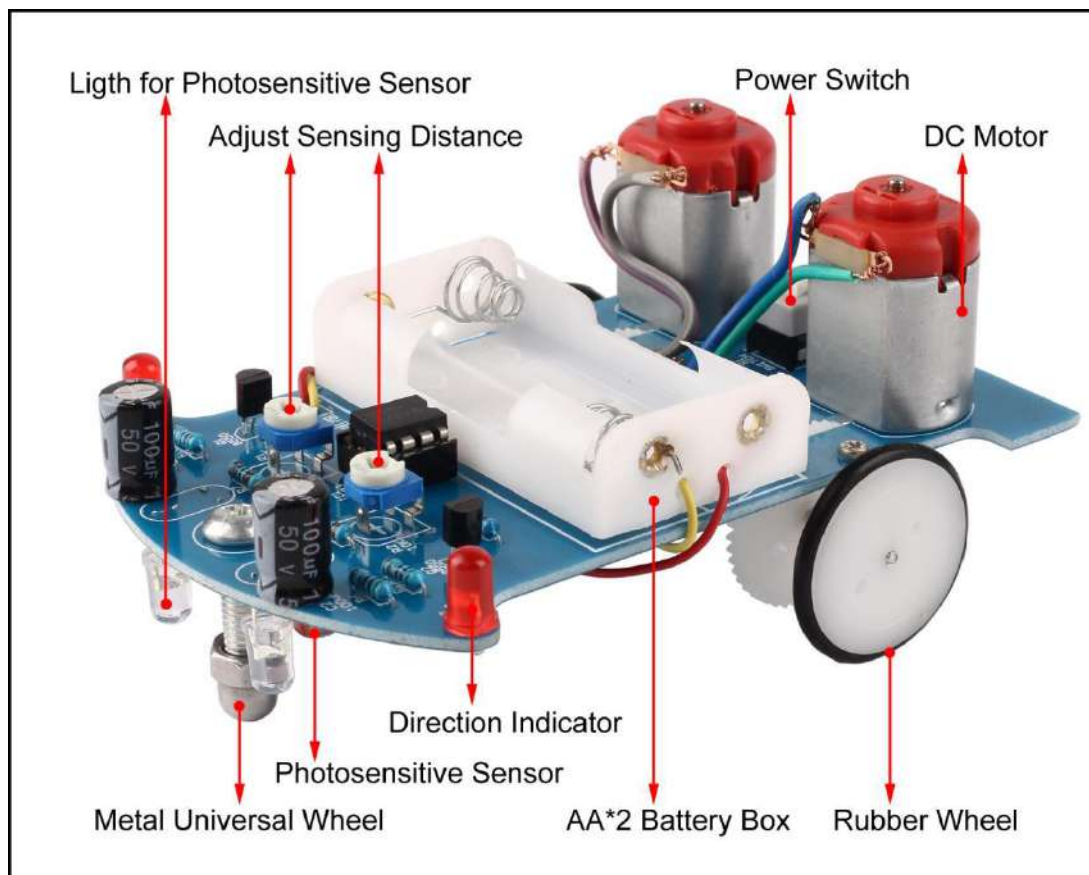
7.Application:

- 1>.Training soldering skills
- 2>.Student school
- 3>.DIY production
- 4>.Project Design
- 5>.Electronic competition
- 6>.Gift giving

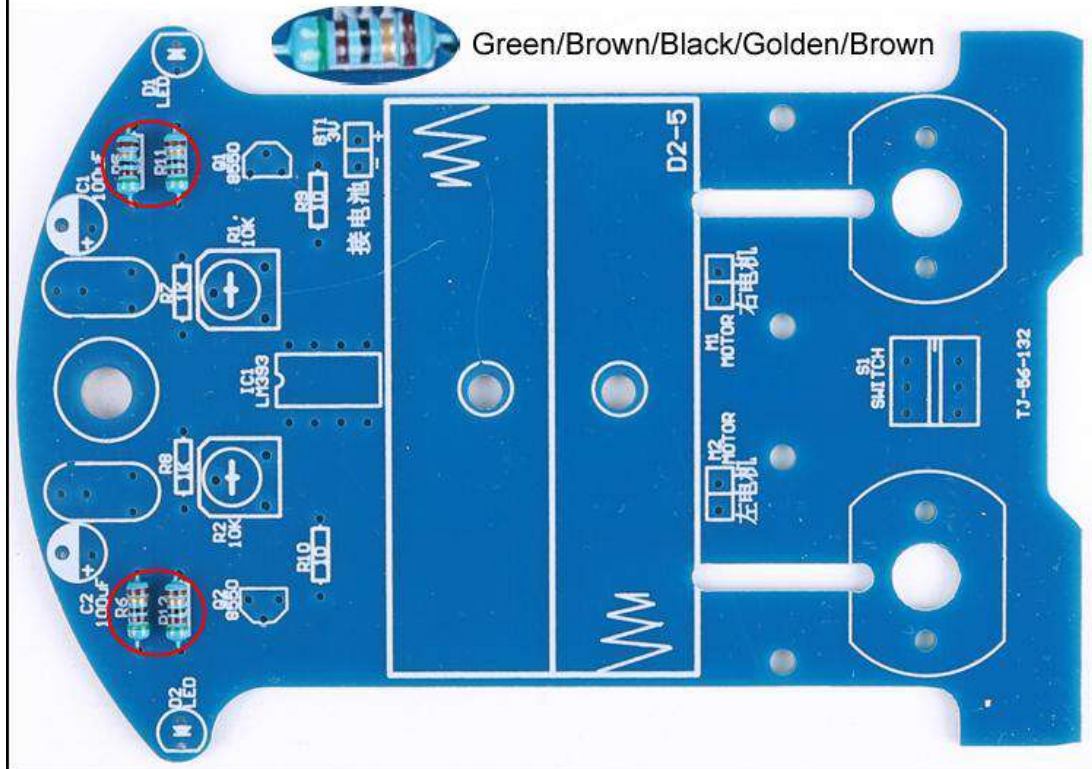
8. Installation Tips:

- 1>.User needs to prepare the soldering tool at first.
 - 1.1>.Soldering iron (<50 Watt)
 - 1.2>.Rosin core ("radio") solder
 - 1.3>.Wire cutters
 - 1.4>.Wire strippers
 - 1.5>.' + ' screwdriver
- 2>.Please be patient until the installation is complete.
- 3>.The package is DIY kit.It need finish install by user.
- 4>.The soldering iron can't touch the components for a long time(1.0 second), otherwise it will damage the components.
- 5>.Pay attention to the positive and negative of the components.
- 6>.Strictly prohibit short circuit.
- 7>.User must install the LED according to the specified rules.Otherwise some LED will not light.
- 8>.Install complex components preferentially.
- 9>.Make sure all components are in right direction and right place.
- 10>.It is strongly recommended to read the installation manual before starting installation!!!
- 11>.Please wear anti-static gloves or anti-static wristbands when installing electronic components.

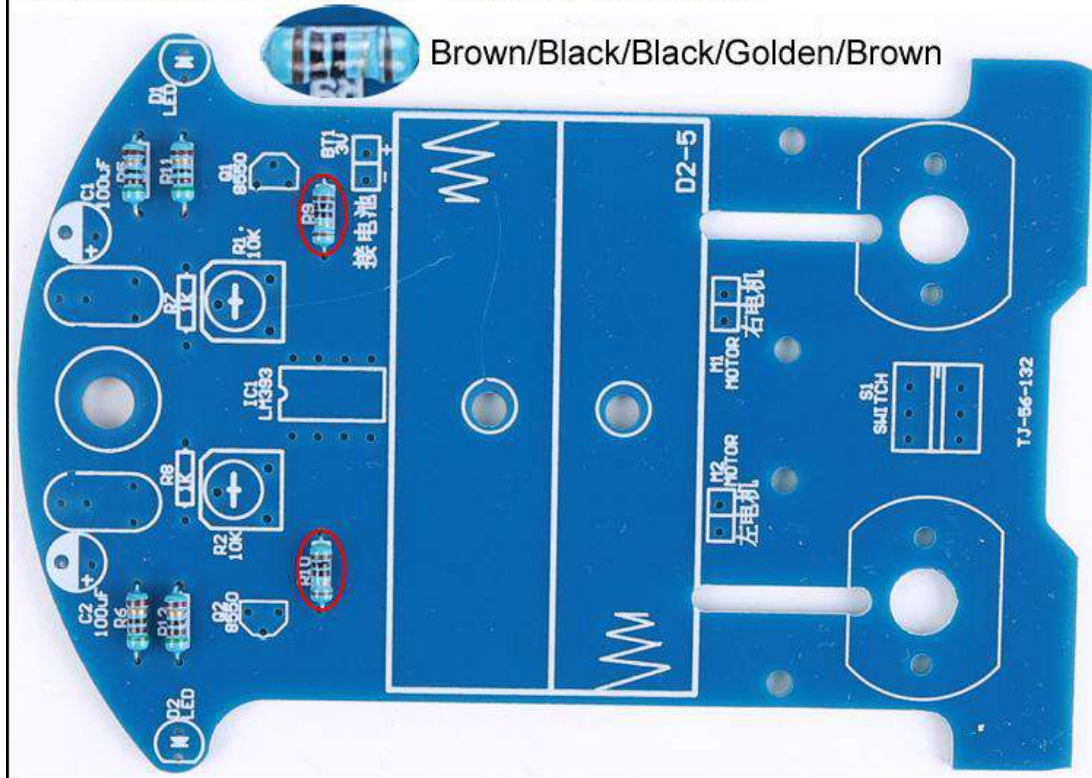
9. Installation Steps(Please be patient install!!!!):



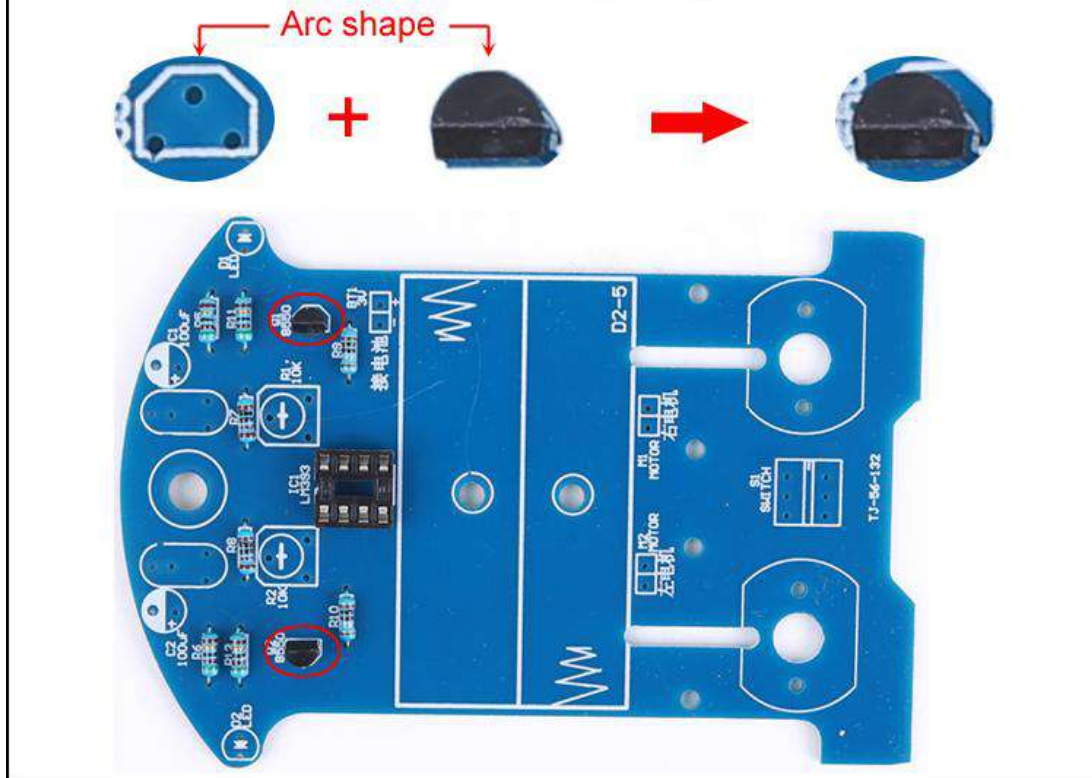
Step 1: Install 4pcs 51ohm Metal Film Resistor at R5,R6,R11,R12.
Measure resistor value by ohmmeter or its color.



Step 2: Install 2pcs 10ohm Metal Film Resistor at R9,R10.
Measure resistor value by ohmmeter or its color.



Step 5: Install 2pcs TO-92 S8550 Transistor at Q1,Q2.Pay attention to the installation direction.Arc screen printing corresponds to arc case.



Step 6: Identify the positive(anode) and negative(cathode) lead of LED.The leads of the LED must be installed correctly, otherwise the LED cannot be turned on.Here are four methods as following:

6.1>.According to the length of the LED lead to distinguish. The longer pin is positive(anode) lead. The shorter pin is negative(cathode) lead.

6.2>.Identify the negative(cathode) of the LED is to look into the plastic case where one can see that the negative(cathode) is much thicker/bigger inside the plastic case than the anode lead.

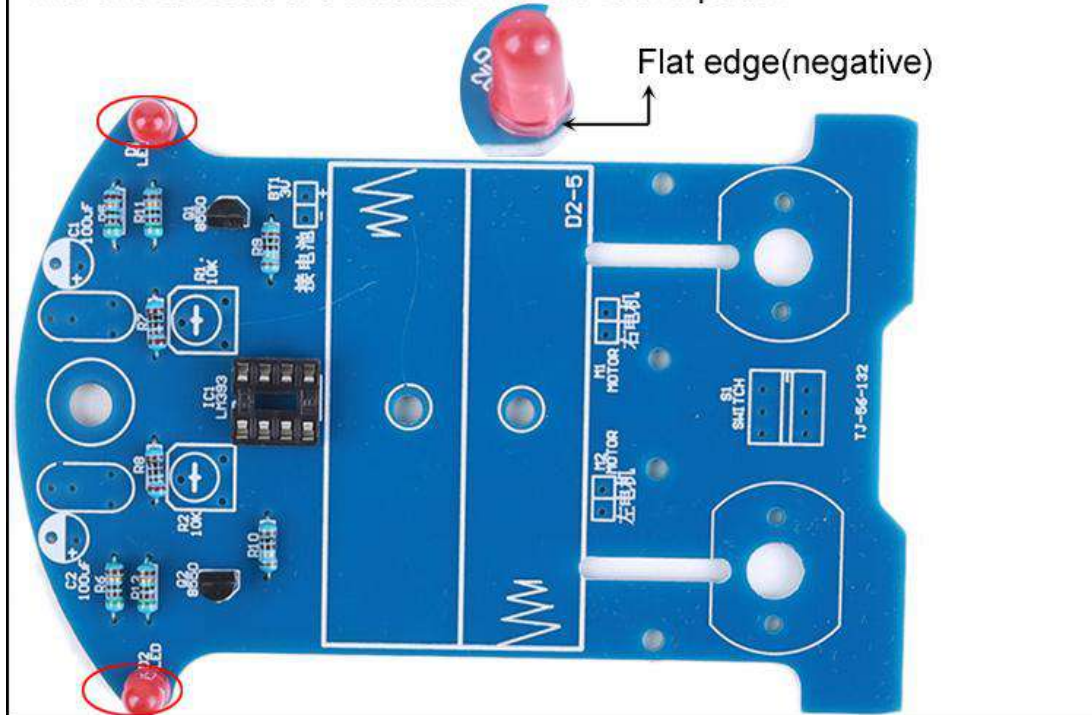
6.3>.Identify by edge of plastic case.The negative(cathode) lead of the LED should be the pin nearest the flat on the plastic case.

6.4>.Test by 3V battery or multimeter.The pin is positive(anode) lead which has connect to positive of 3V if LED can light up after connect 3V power supply. (LED can not be powered directly from 3V for a short time:less then 0.5second)

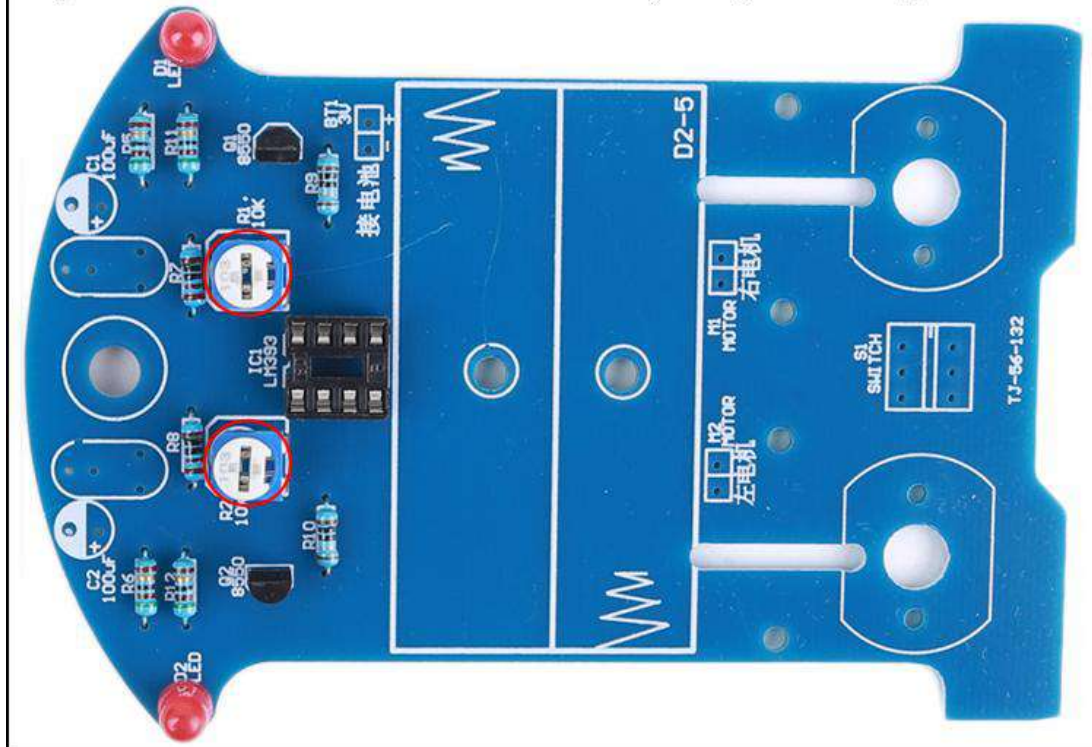
6.5>.Note:If the flat on the package disagrees with other indicators(short lead large cathode lead end), then other indicators take priority. I.e. if the flat disagrees with the lead length,use the lead length as the cathode indicator.



Step 7: Install 2pcs 5mm Red LED at D1,D2.
Identify the positive(anode) and negative(cathode) by Step7.
The longer lead is inserted into the rectangular pad(positive).
The shorter lead are inserted into the round pads.



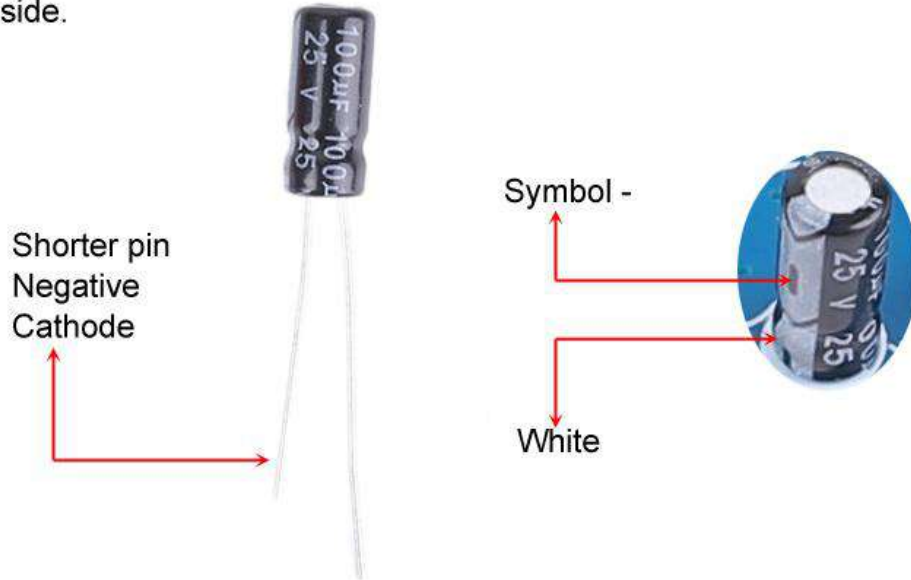
Step 8: Install 2pcs 10K Potentiometer at R1,R2. They are used to adjust the sensing distance of the infrared receiver. R1 and R2 need to be adjusted if the smart car can't move normally along the black guide rail.



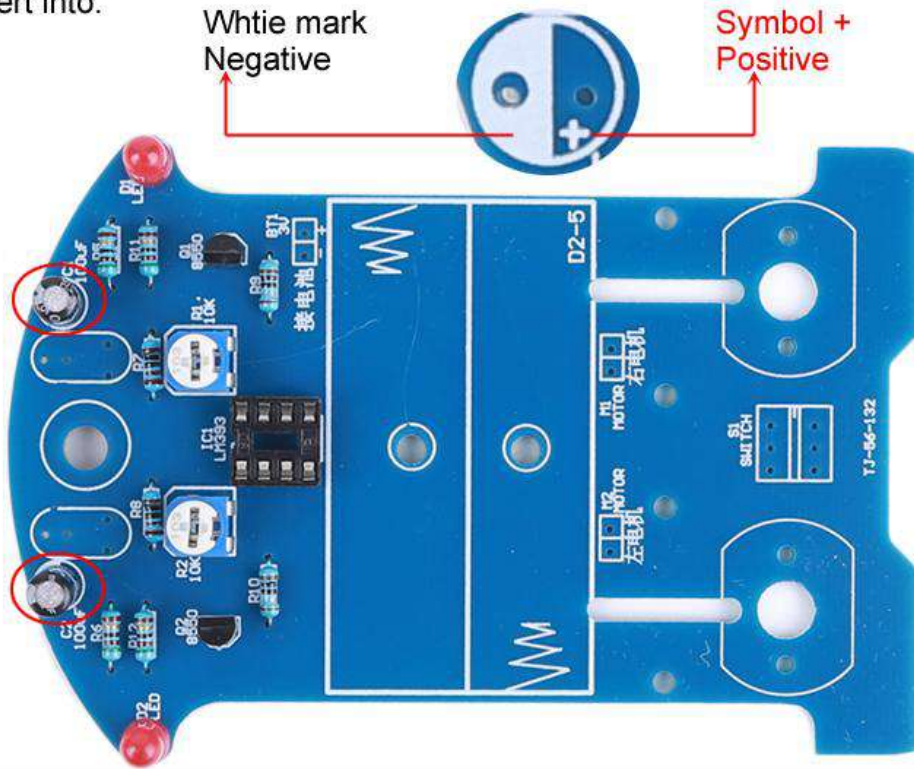
Step 9: Identify the positive and negative of Electrolytic Capacitor.
Here are two methods as following:

9.1>.According to the length of leads.The longer pin is positive(anode) .
The shorter pin is negative(cathode).

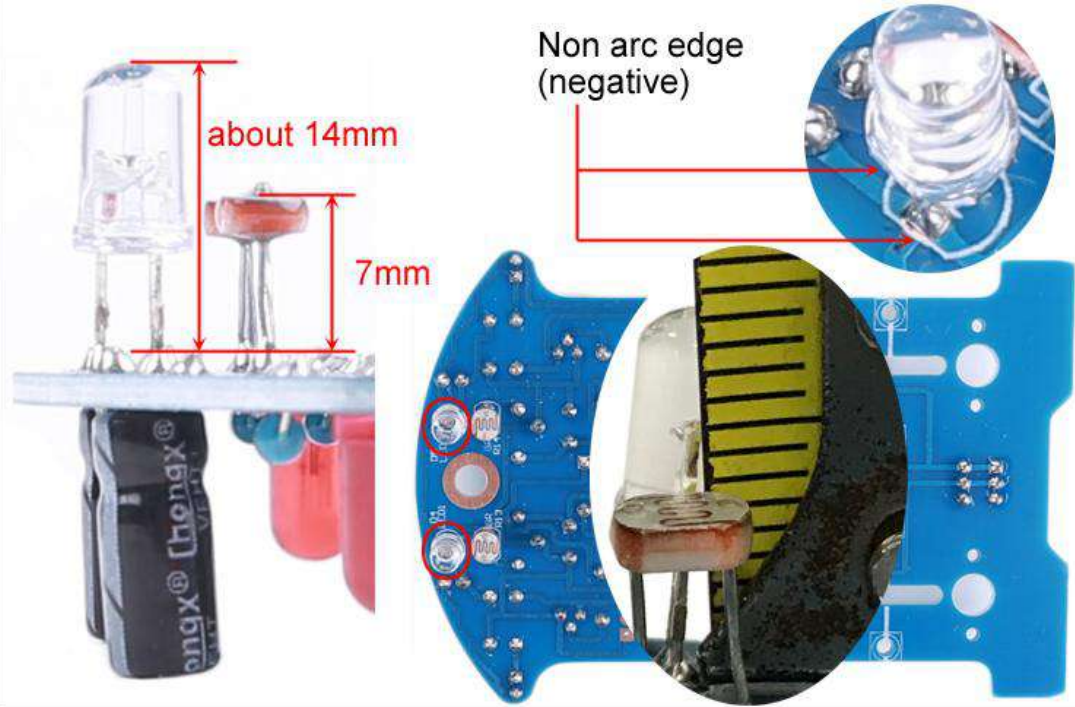
9.2>.Identify by color and symbol of capacitor surface. It is
negative(cathode) where the capacitor has white mark on the surface and
' - 'inside.



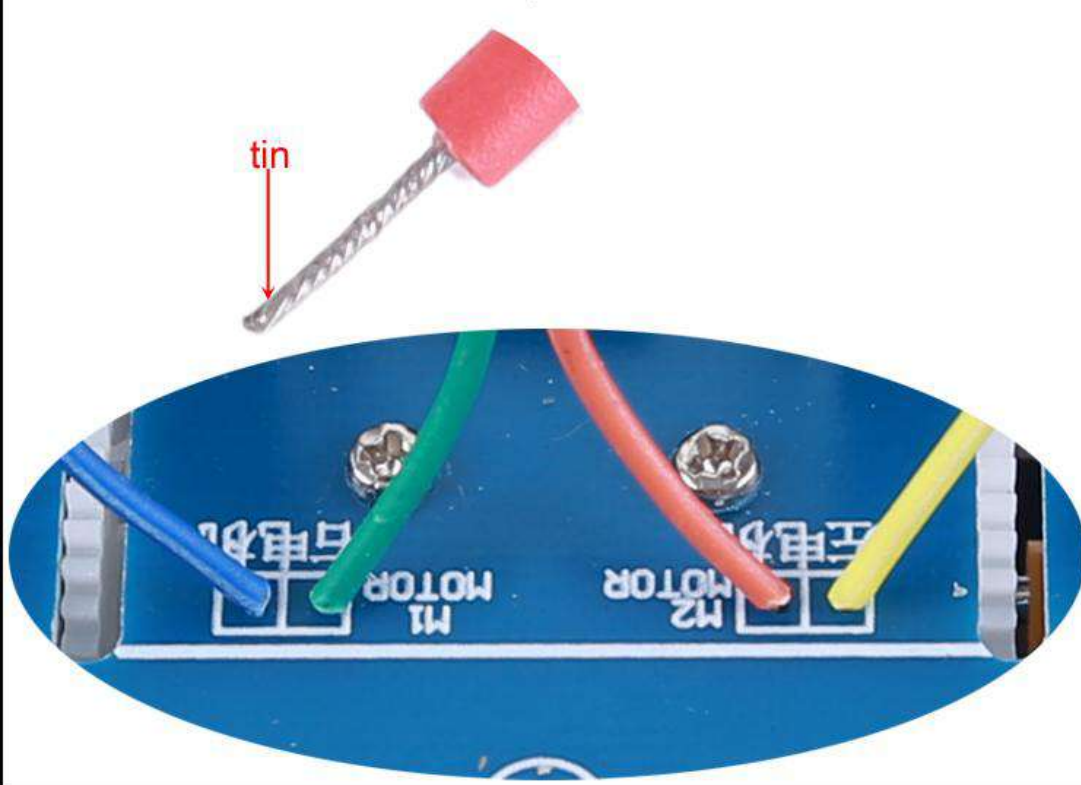
Step 10: Install 2pcs 100uF Electrolytic Capacitor at C1,C2. There is a white '+' on PCB silk screen printing where the positive(anode) can insert into.



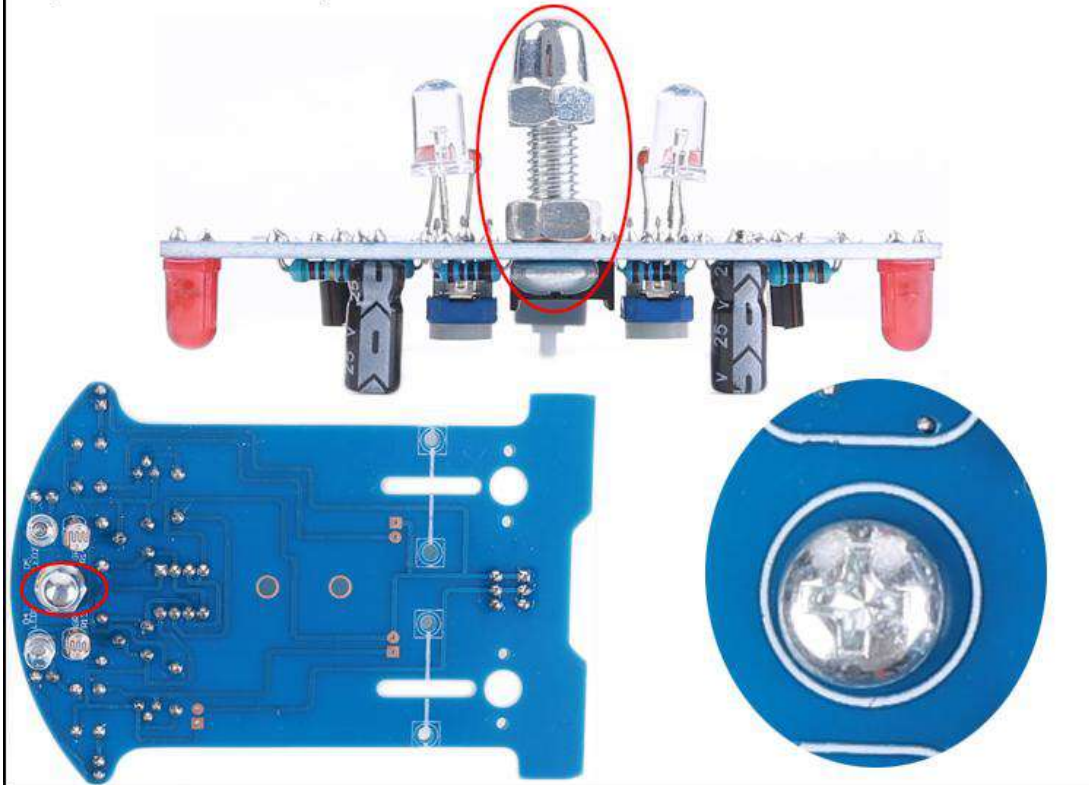
Step 13: Install 2pcs 5mm White LED at D4,D5 on PCB's another side.
Note: Make sure LED's height is about 14mm. Identify the positive and negative by Step 6. The longer lead is inserted into the rectangular pad (positive). The shorter lead are inserted into the round pads.



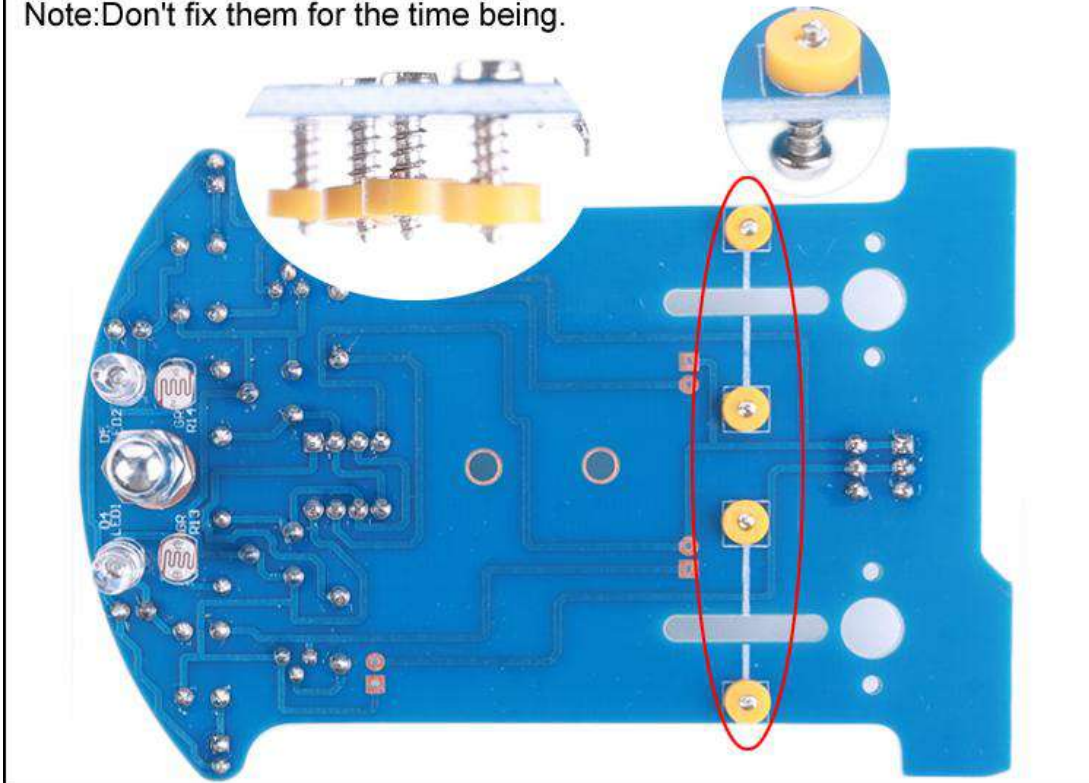
Step 14: Separate, strip, and tin both ends of 4pcs 6cm wires. Solder one end of each wire into the four pads that are marked M1 and M2.



Step 15: Install front support pillar by 1pcs M5*20mm Screw, 1pcs M5 Nut and 1pcs M5 Acorn Nut.

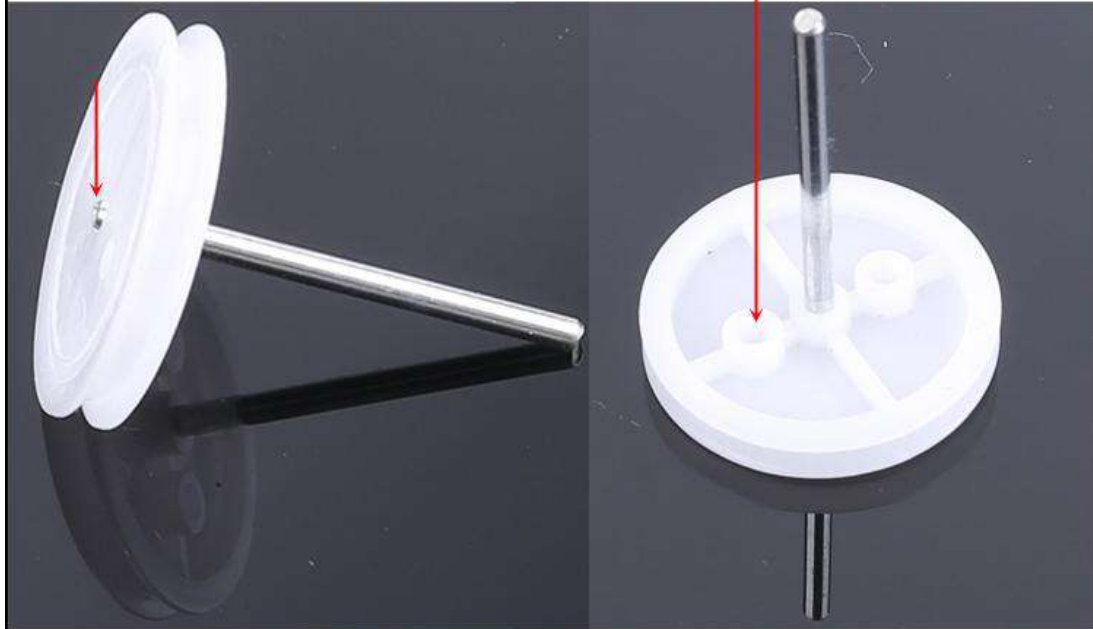


Step 16: Install 4pcs D2.0mm Yellow Plastic Spacer by 4pcs D2.2*8mm Screw. Pay attention to the installation direction of PCB.
Note: Don't fix them for the time being.



Step 17: Insert 1pcs D2*30mm Axle from the center hole of the D24mm Wheel. Note that the direction is inserted from one side of the raised sleeve of the wheel.

Identify installation direction



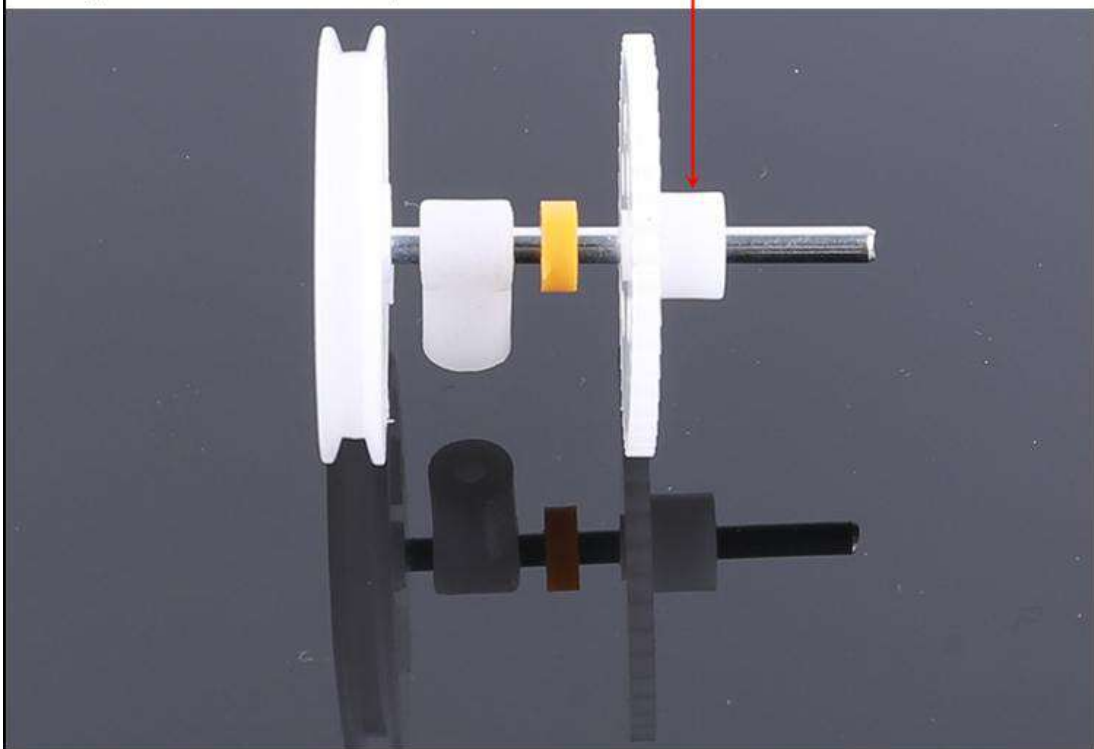
Step 18: Insert 1pcs D2.5mm Three-way Sleeve on D2*30mm Axle and close to the D24mm Wheel.



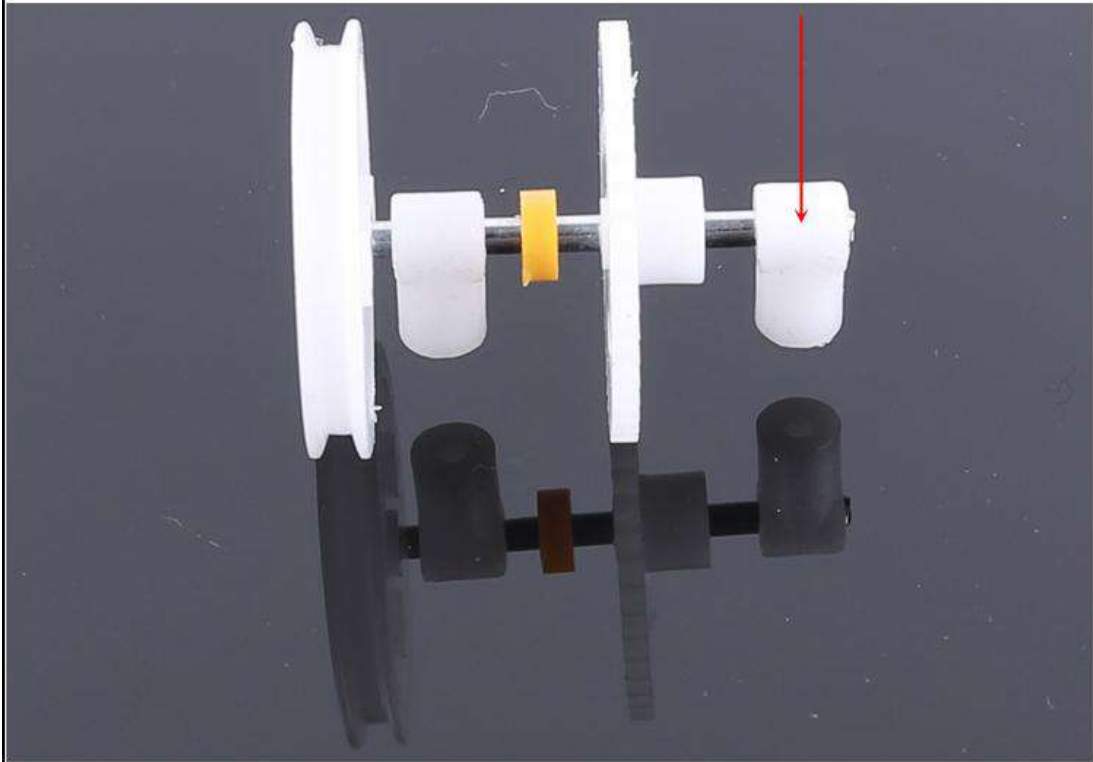
Step 19: Insert 1pcs D2.0mm Plastic Spacer on D2*30mm Axle and close to the D2.5mm Three-way Sleeve.



Step 20: Insert 1pcs D22mm Gear on D2*30mm Axle and close to the D2.0mm Plastic Spacer. Note: The raised smaller gear is on the side away from the Plastic Spacer.



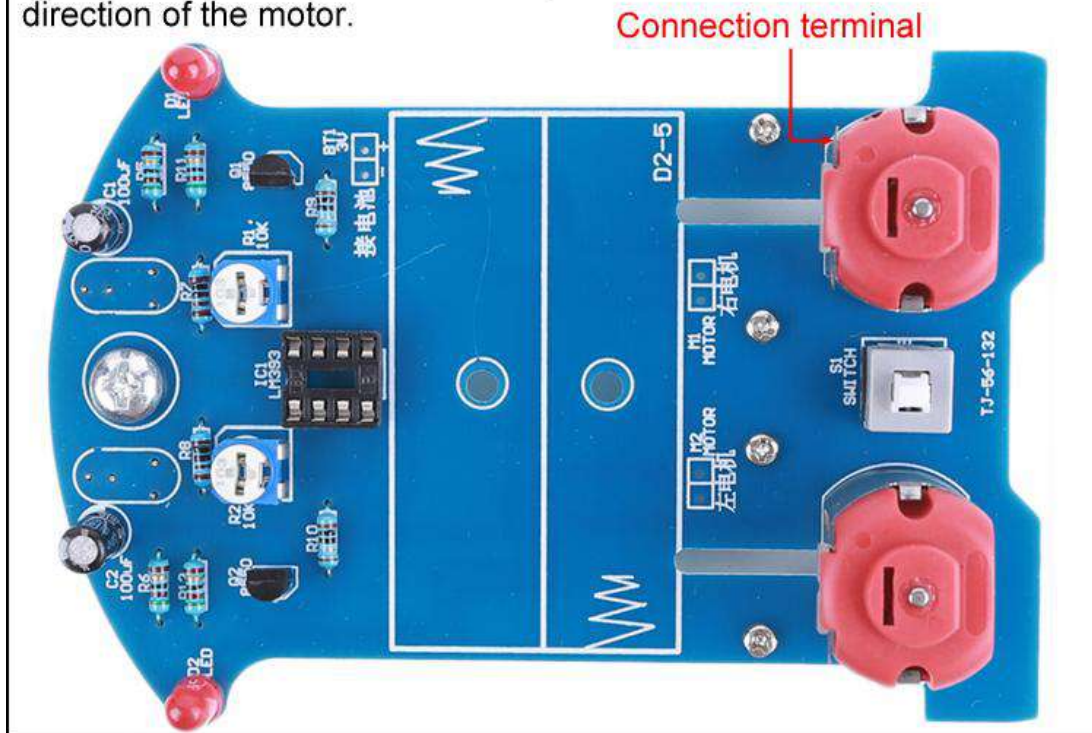
Step 21: Install 1pcs D2.5mm Three-way Sleeve at the end of D2*30mm Axle.



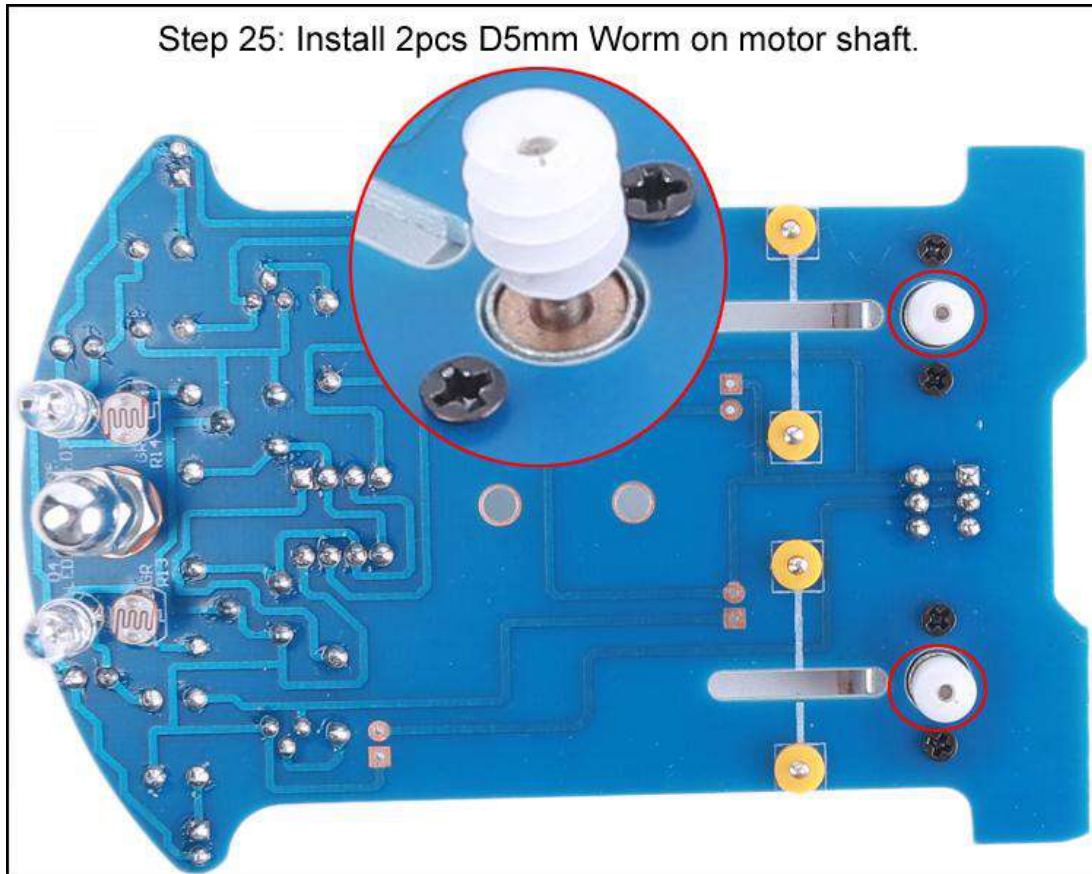
Step 22: Install 1pcs D24mm Tires on D24mm Wheel.



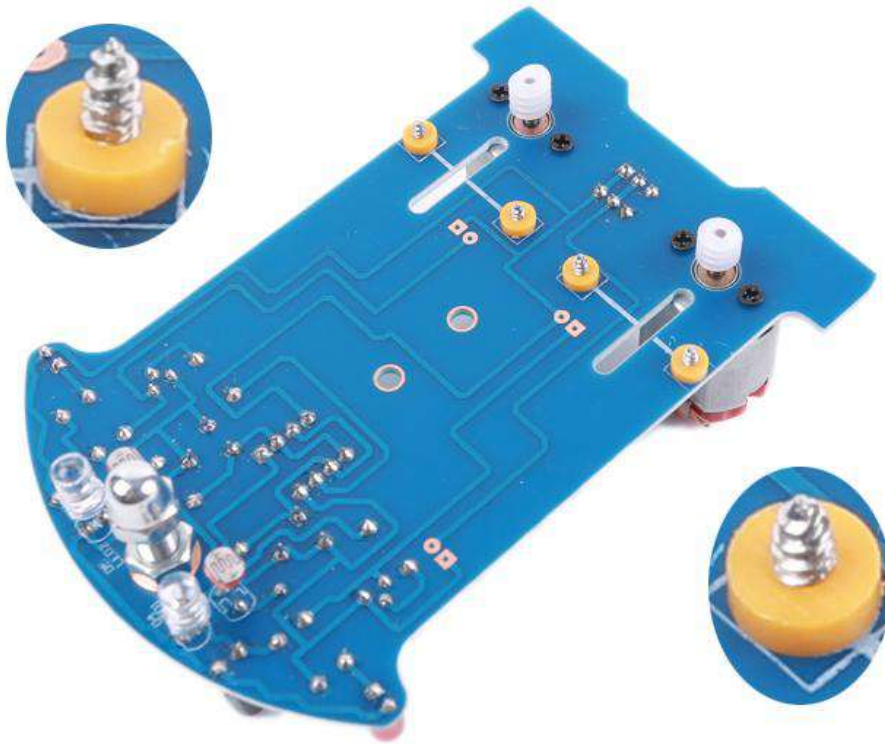
Step 23: Assemble another wheel according to Step 16 ~ Step 22.
Step 24: Install and fix 2pcs JD3-100 DC Motor at M1,M2 by 4pcs D1.7*4mm Black Motor Screw. Pay attention to the installation direction of the motor.



Step 25: Install 2pcs D5mm Worm on motor shaft.



Step 26: Adjust the screw to facilitate subsequent installation
(That has be install at Step 16)



Step 27: Fix the 2pcs assembled wheel on 4pcs D2.0mm Yellow Plastic Spacer. Adjust distance between accessories according to actual situation.



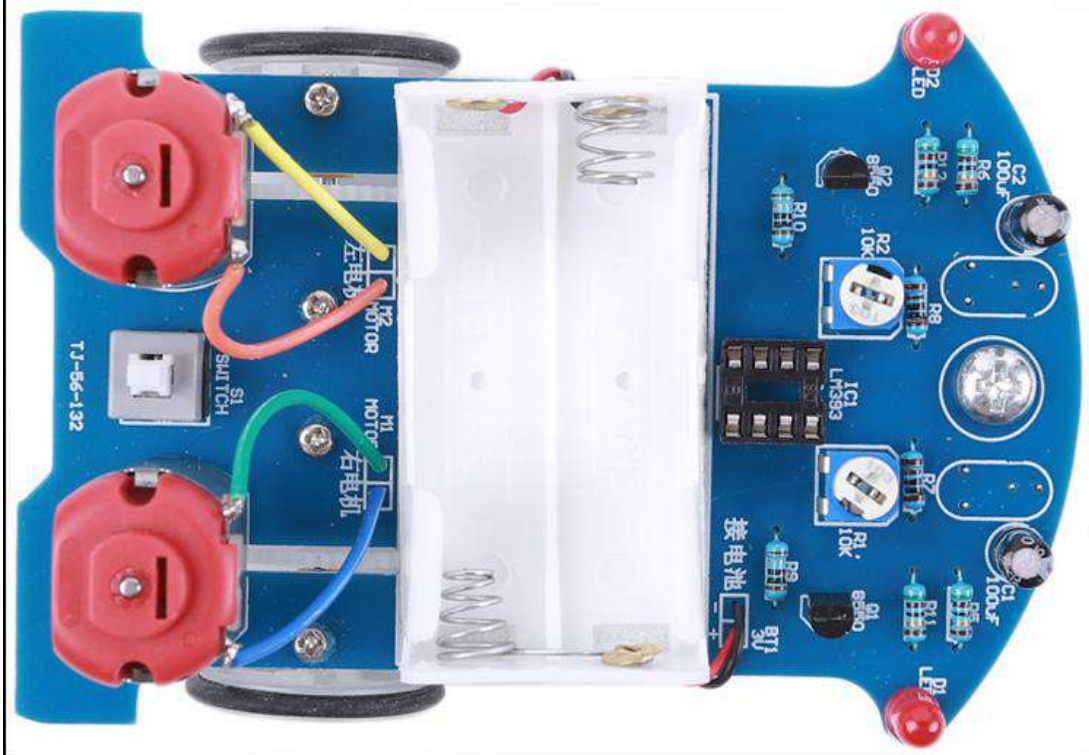
Step 28: Connect four wires to 2pcs motors .Pay attention to the installation sequence of wires and otherwise the car may move abnormally.



Step 29: Install and fix 1pcs AA*2 Battery Holder. Solder the red and black leads from the battery holder to the pads on the PCB and making sure to put the red wire in the "+" hole and the black wire in the "-" hole.



Step 30: Peel backing paper from the battery holder and, after wrapping the wires around the circuit board, press the holder to the circuit board, on the same side as the IC socket.



Step 31: Install 1pcs DIP-8 LM393 at IC Socket. There is a mark(notch) on LM393 and there is a mark(notch) on one end of the IC Socket where the IC can place on. These two marks are corresponding to each other and are used to specify the installation direction of the IC.



32>.Step 32: Installation Fault debugging:

32.1>.Insert two AA batteries (not included) in the battery holder, being sure to put them so the flat end of each batter is touching spring in holder.

32.2>.Turn ON switch.It is OK if 2pcs Red LED turn ON.Otherwise, the red LED may be installed incorrectly.

32.3>.The connection sequence of motor wires needs to be exchanged if the rotation direction of the motor is wrong.

32.4>.The adjusting potentiometer is used to change detection distance of the photosensitive sensor.

33>.Step 33: Connect to power supply and enjoy the effect.



34>.Step 34: If the robot does not track the line very well, make small adjustments the to trimpots and then retest the line following. You can improve the ability of the car to follow the line by repeatedly testing and adjusting the pots by small amounts.

To make it line follow, what you did was set it on its back where the motors could turn but not move robot and then adjust one potentiometer until when put your finger over the sensor it would stop turning and when left exposed that side would turn. Then did the opposite on the other side, and was able to put it on the track provided on the sheet.

