D2-5 Intelligent Tracking Car DIY Kit

I. 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.

II. 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

III. 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

IV. Component Listing:

NO.	Component Name	PCB Marker	Parameter	Quantity
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*72*1.6mm)		D2-5	1
Note:Users can complete the installation according to the PCB silk screen and component list.				

V. Schematic Diagram:
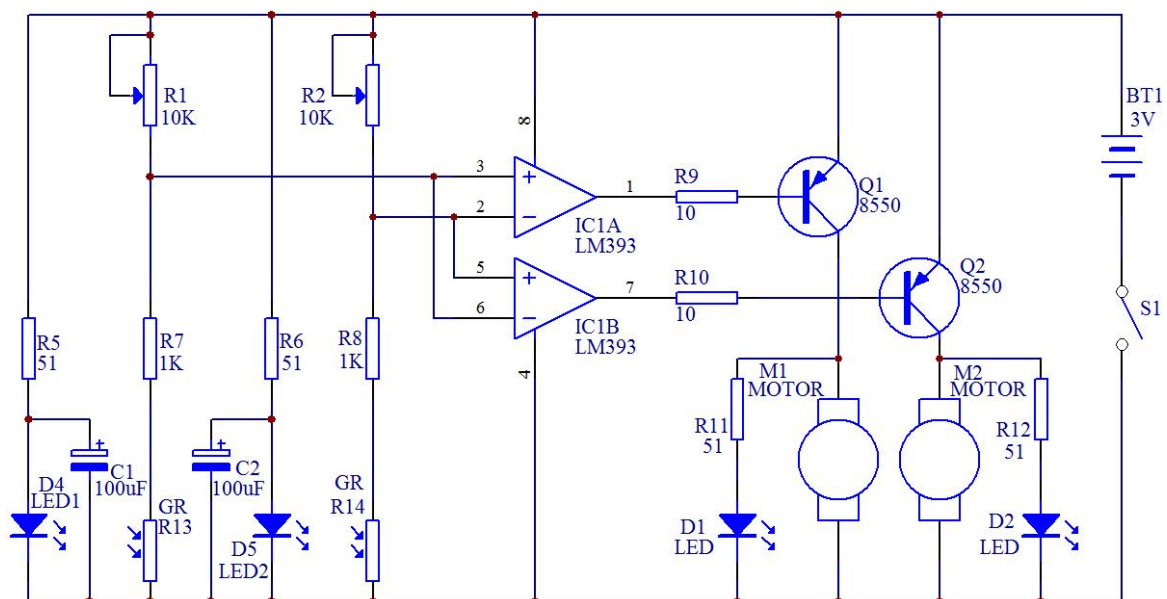
VI. Application:

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

VII. 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>.#1 Philips 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.

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

1>.Step 1: Identify the resistor value.
    1.1>.User can identify the resistor value according to the five colour rings above the resistor.
    1.2>.It is 51ohm resistor if the colour rings is Green/Brown/Black/Golden/Brown;
    1.3>.It is 10ohm resistor if the colour rings is Brown/Black/Black/Golden/Brown;
    1.4>.It is 1Kohm resistor if the colour rings is Brown/Black/Black/Brown/Brown;
    1.5>.User can also measure resistor value by ohmmeter.

2>.Step 2: Install 4pcs 51ohm Metal Film Resistor at R5,R6,R11,R12. Identify the resistor value by Step1.

3>.Step 3: Install 2pcs 10ohm Metal Film Resistor at R9,R10. Identify the resistor value by Step1.

4>.Step 4: Install 2pcs 1K Metal Film Resistor at R7,R8. Identify the resistor value by Step1.

5>.Step 5: Install 1pcs DIP-8 IC Socket at IC1.There is a mark(notch) on one end of the IC Socket and there is a mark(curved silk screen printing) on PCB where the IC Socket can place on.These two marks are corresponding to each other and are used to specify the installation direction of the IC Socket.

6>.Step 6: Install 2pcs TO-92 S8550 Transistor at Q1,Q2.Pay attention to the installation direction.Arc screen printing corresponds to arc case.

7>.Step 7: 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:

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

    7.2>.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.

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

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

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

8>.Step 8: 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.

9>.Step 9: 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.

10>.Step 10: Identify the positive and negative of Electrolytic Capacitor. Here are two methods as following:

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

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

11>.Step 11: Install 2pcs 100uF Electrolytic Capacitor at C1,C2. There is a white ' + ' on PCB silk screen printing where the positive(anode) can insert into.

12>.Step 12: Install 1pcs 6*6mm Self-Locking switch at S1.

13>.Step 13: Install 2pcs CDS5 Photoresistor at R13,R14 on PCB's another side.Note:Make sure Photoresistor's height is about 5mm.

14>.Step 14: 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 Step7.The longer lead is inserted into the rectangular pad(positive). The shorter lead are inserted into the round pad.

15>.Step 15: 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.

16>.Step 16: Install front support pillar by 1pcs M5*20mm Screw, 1pcs M5 Nut and 1pcs M5 Acorn Nut.

17>.Step 17: 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.

18>.Step 18: 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.

19>.Step 19: Insert 1pcs D2.5mm Three-way Sleeve on D2*30mm Axle and close to the D24mm Wheel.

20>.Step 20: Insert 1pcs D2.0mm Plastic Spacer on D2*30mm Axle and close to the D2.5mm Three-way Sleeve.

21>.Step 21: 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.

22>.Step 22: Install 1pcs D2.5mm Three-way Sleeve at the end of D2*30mm Axle.

23>.Step 23: Install 1pcs D24mm Tires on D24mm Wheel.

24>.Step 24: Assemble another wheel according to Step 17 ~ Step 22.

25>.Step 25: 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.

26>.Step 26: Install 2pcs D5mm Worm on motor shaft.

27>.Step 27: Adjust the screw to facilitate subsequent installation(That has be install at Step 18)

28>.Step 28: Fix the 2pcs assembled wheel on 4pcs D2.0mm Yellow Plastic Spacer.Adjust the distance between the accessories according to the actual situation.

29>.Step 29: Connect four wires to 2pcs motors .Pay attention to the installation sequence of wires and otherwise the car may move abnormally.

30>.Step 30: 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.

31>.Step 31: Peel the 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.

32>.Step 32: 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.

33>.Step 33: Installation Fault debugging:

33.1>.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.

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

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

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

34>.Step 34: Connect to power supply and enjoy the effect.

35>.Step 35: 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.

IX. Install shown steps:

Step 1: Identify the resistor value.

1>.User can identify the resistor value according to the five colour rings above the resistor.

2>.It is 51ohm resistor if the colour rings is Green/Brown/Black/Golden/Brown;

3>.It is 10ohm resistor if the colour rings is Brown/Black/Black/Golden/Brown;

4>.It is 1Kohm resistor if the colour rings is Brown/Black/Black/Brown/Brown;

5>.User can also measure resistor value by ohmmeter.

 51ohm Green/Brown/Black/Golden/Brown

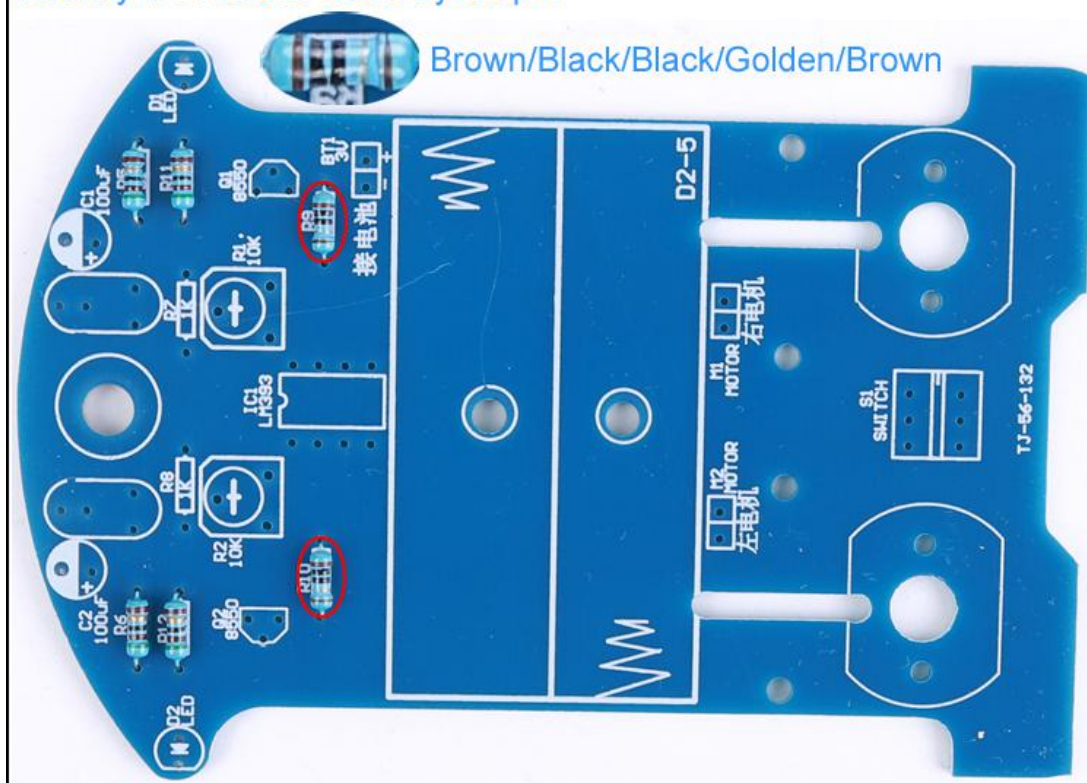 10ohm Brown/Black/Black/Golden/Brown

 1Kohm Brown/Black/Black/Brown/Brown

Step 2: Install 4pcs 51ohm Metal Film Resistor at R5,R6,R11,R12.
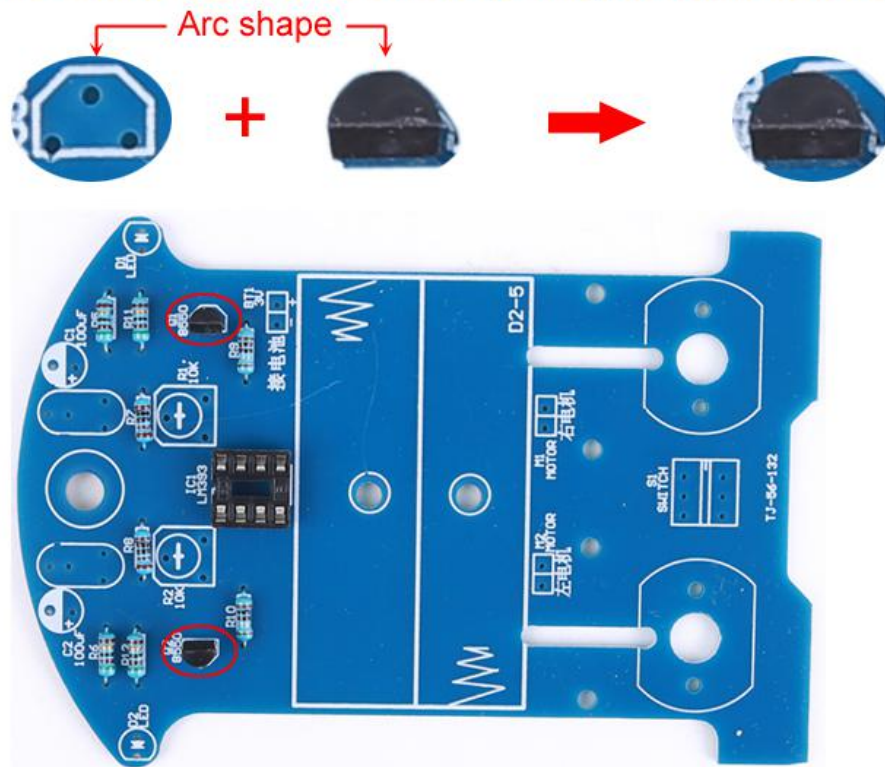Identify the resistor value by Step1.

Green/Brown/Black/Golden/Brown

Step 3: Install 2pcs 10ohm Metal Film Resistor at R9,R10.
Identify the resistor value by Step1.

Brown/Black/Black/Golden/Brown

Step 4: Install 2pcs 1K Metal Film Resistor at R7,R8.
Identify the resistor value by Step1.

Brown/Black/Black/Brown/Brown

Step 5: Install 1pcs DIP-8 IC Socket at IC1.There is a mark(notch) on
one end of the IC Socket and there is a mark(curved silk screen
printing) on PCB where the IC Socket can place on.These two marks
are corresponding to each other and are used to specify the
installation direction of the IC Socket.

curved   +   notch   →

IC1
LM393

Step 6: Install 2pcs TO-92 S8550 Transistor at Q1,Q2.Pay attention to the installation direction.Arc screen printing corresponds to arc case.

Arc shape

+ →

Step 7: 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:

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

　　7.2>.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.

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

　　7.4>.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)

　　7.5>.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.

Shortor pin
Negative
Cathode

Thicker/bigger Metal
Negative(cathode)

Flat edge
Negative(cathode)

Step 8: 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.

Flat edge(negative)
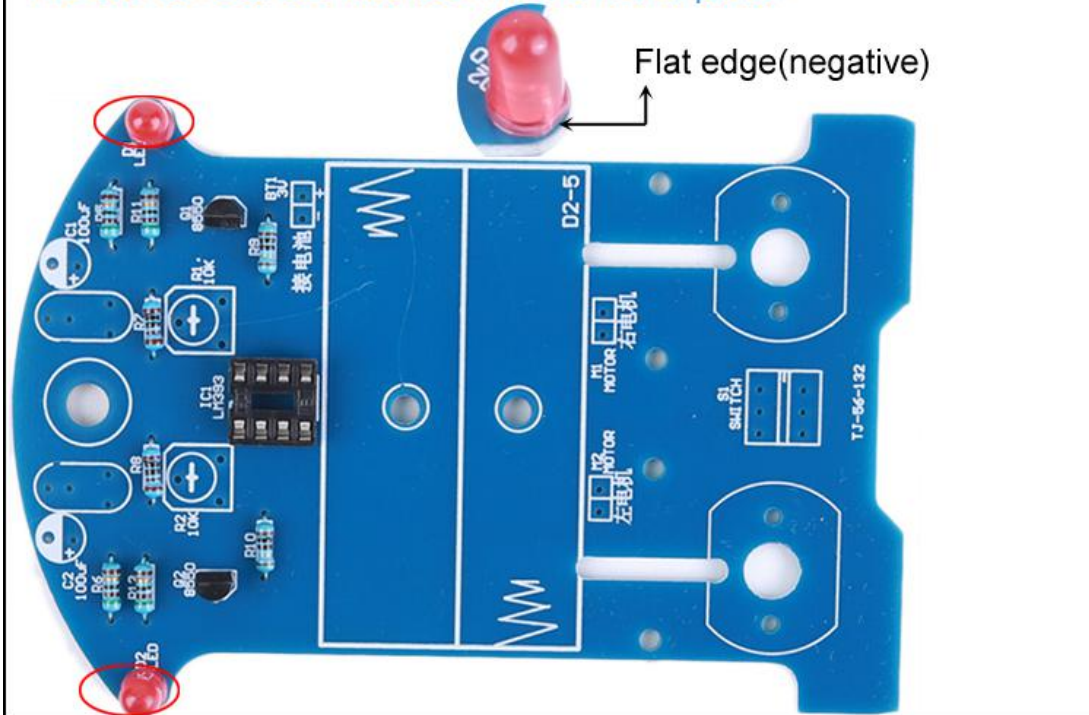
Step 9: Install 2pcs 10K Potentiometer at R1,R2. They are used to adjust the sensing distance of the infrared receiver. R1 and R2 need to be adjusted if the smart car can't move normally along the black guide rail.
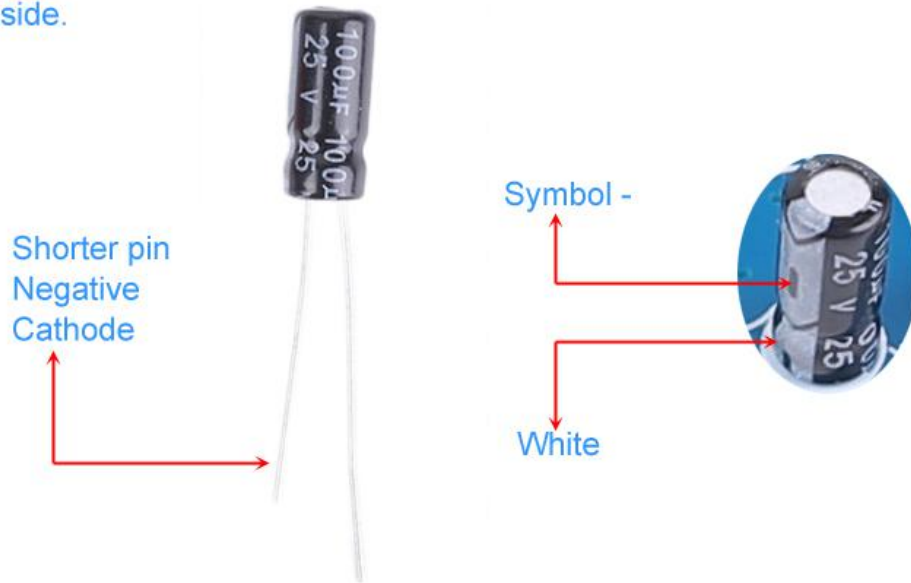
Step 10: Identify the positive and negative of Electrolytic Capacitor.
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    10.1>.According to the length of leads.The longer pin is positive(anode)
 The shorter pin is negative(cathode).
    10.2>.Identify by color and symbol of capacitor surface. It is
negative(cathode) where the capacitor has white mark on the surface and
' - 'inside.

Shorter pin
Negative
Cathode

Symbol -

White

Step 11: Install 2pcs 100uF Electrolytic Capacitor at C1,C2. There is a
white ' + ' on PCB silk screen printing where the positive(anode) can
insert into.

Whtie mark
Negative

Symbol +
Positive
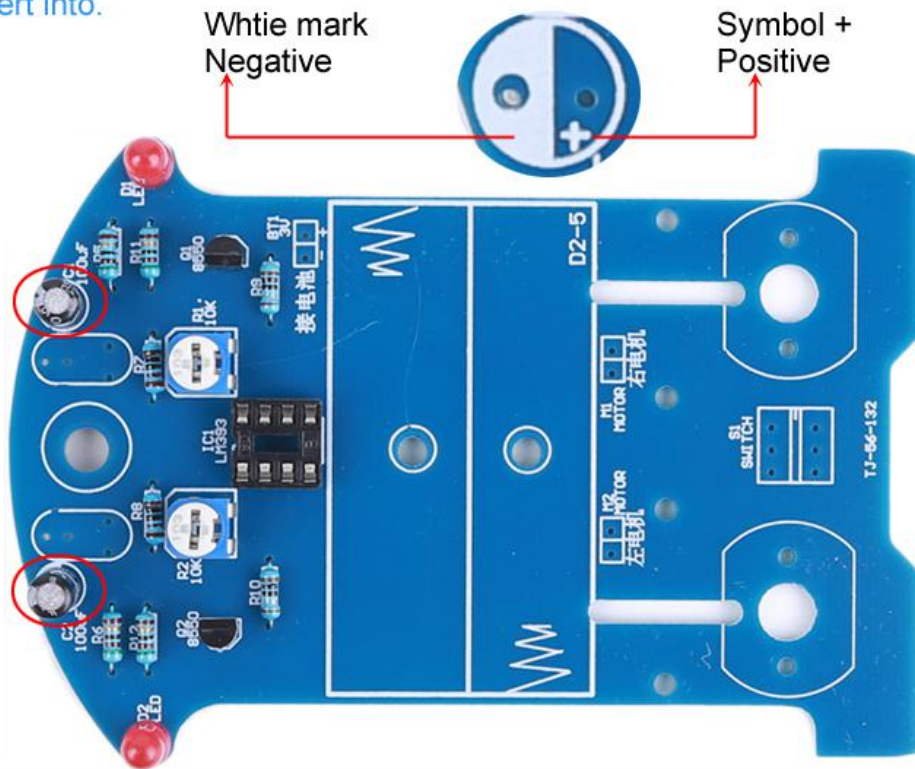
Step 12: Install 1pcs 6*6mm Self-Locking switch at S1.
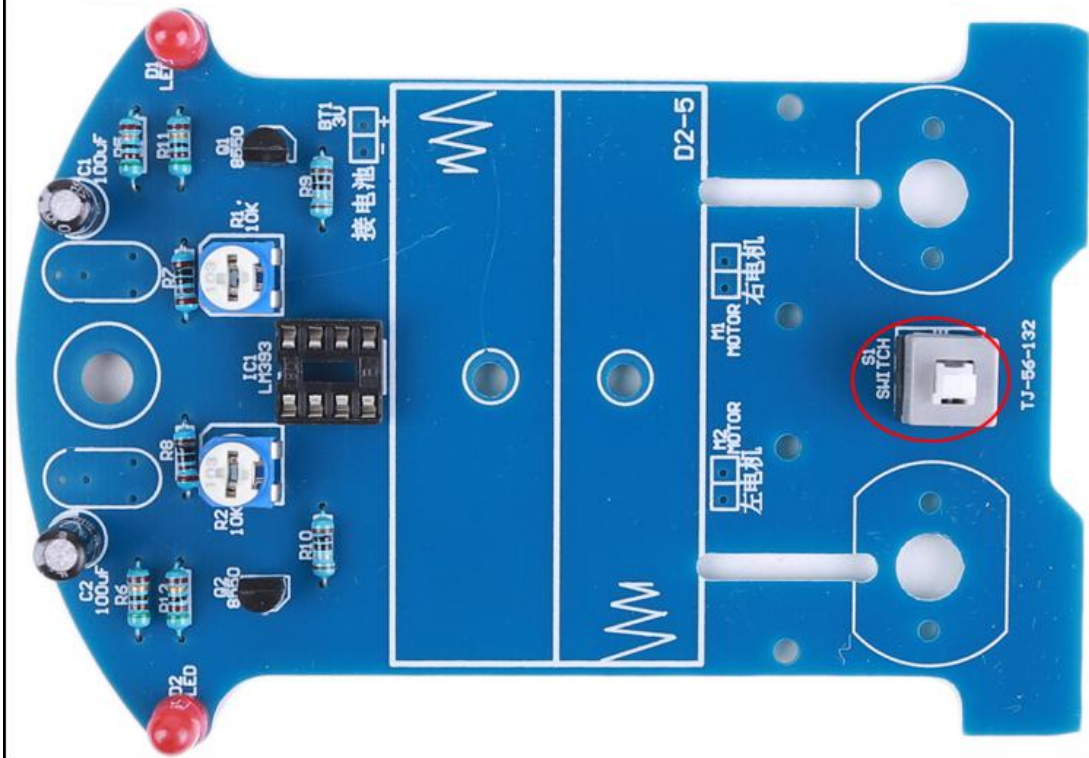
Step 13: Install 2pcs CDS5 Photoresistor at R13,R14 on PCB's another side.Note:Make sure Photoresistor's height is about 7mm.
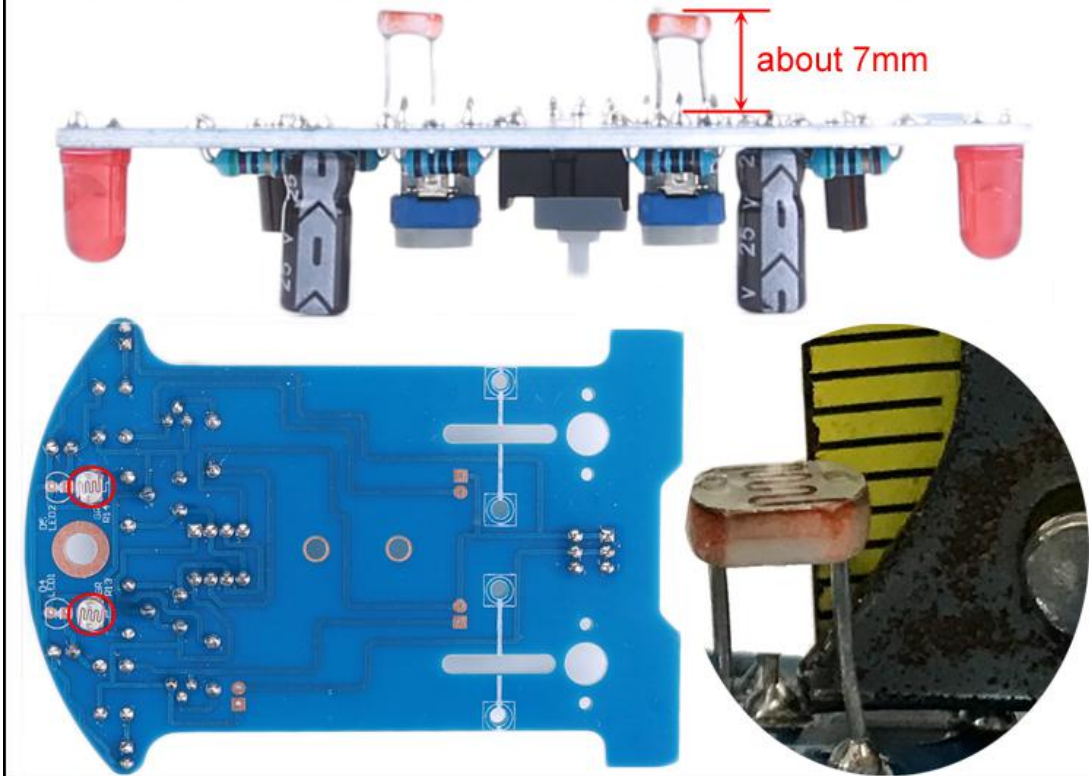
about 7mm

Step 14: 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 Step7.The longer lead is inserted into the rectangular pad(positive). The shorter lead are inserted into the round pads.

about 14mm

7mm

Non arc edge (negative)

Step 15: 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.

tin
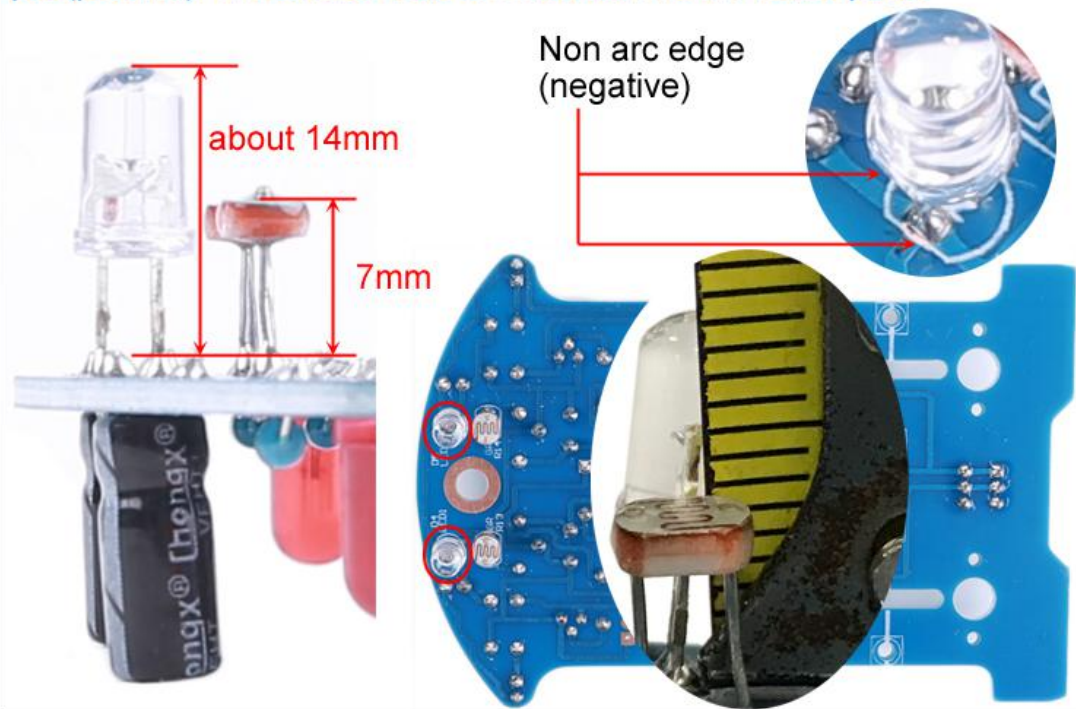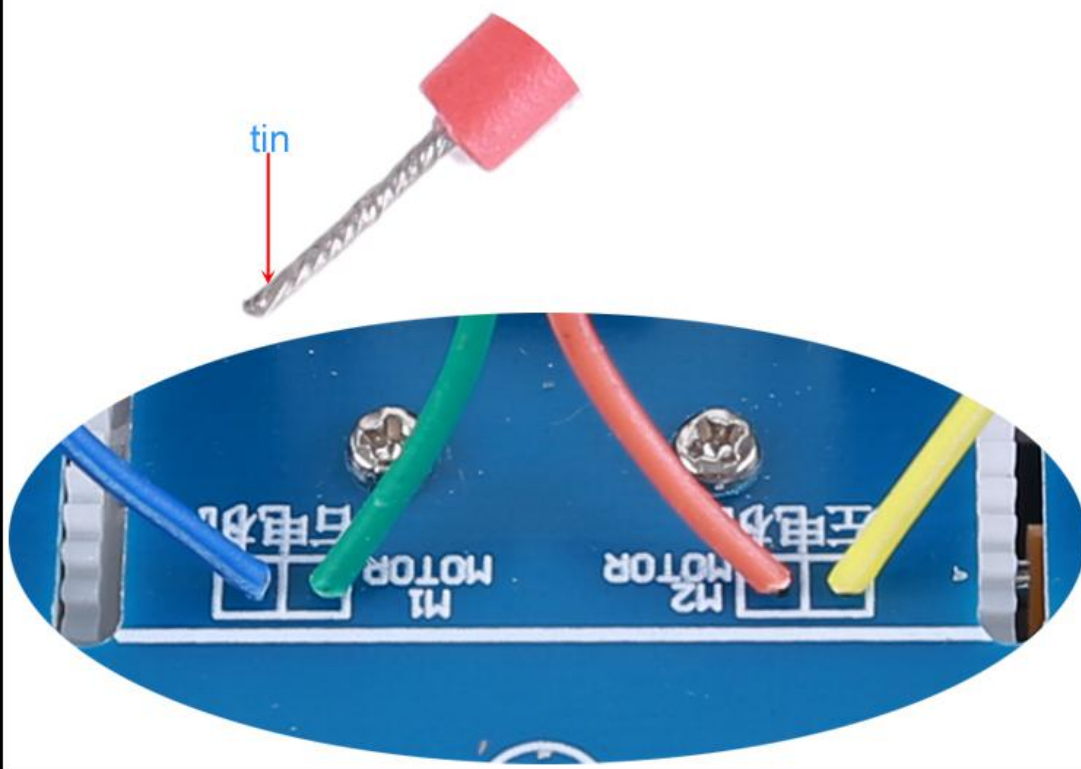
Step 16: Install front support pillar by 1pcs M5*20mm Screw, 1pcs M5 Nut and 1pcs M5 Acorn Nut.

Step 17: 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.
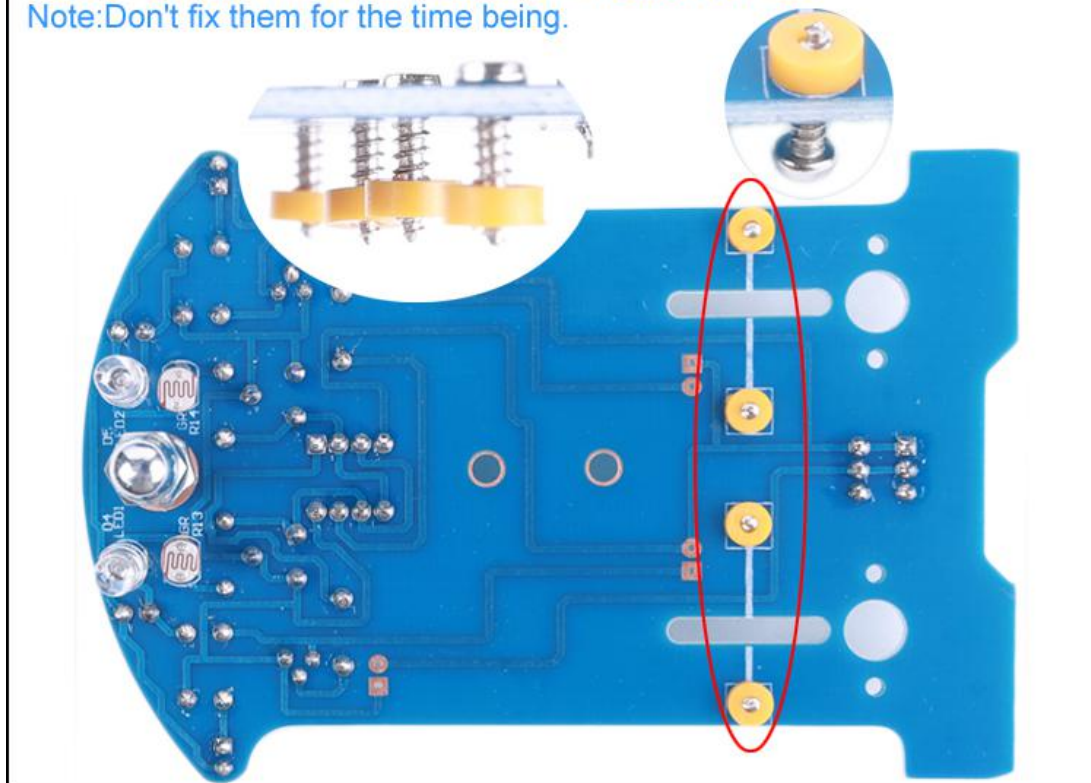
Step 18: Insert 1pcs D2*30mm Axle from the center hole of the D24mm Wheel.Note that the direction is inserted from one side of the raised sleeve of the wheel.

Identify installation direction
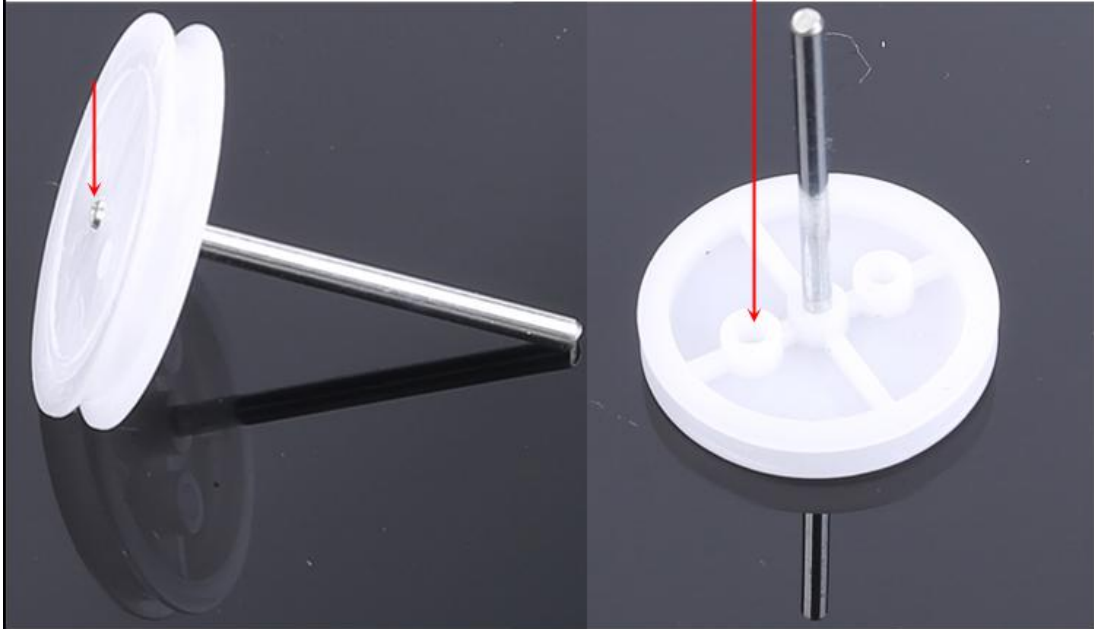
Step 19: Insert 1pcs D2.5mm Three-way Sleeve on D2*30mm Axle and close to the D24mm Wheel.

Step 20: Insert 1pcs D2.0mm Plastic Spacer on D2*30mm Axle and close to the D2.5mm Three-way Sleeve.

Step 21: 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.
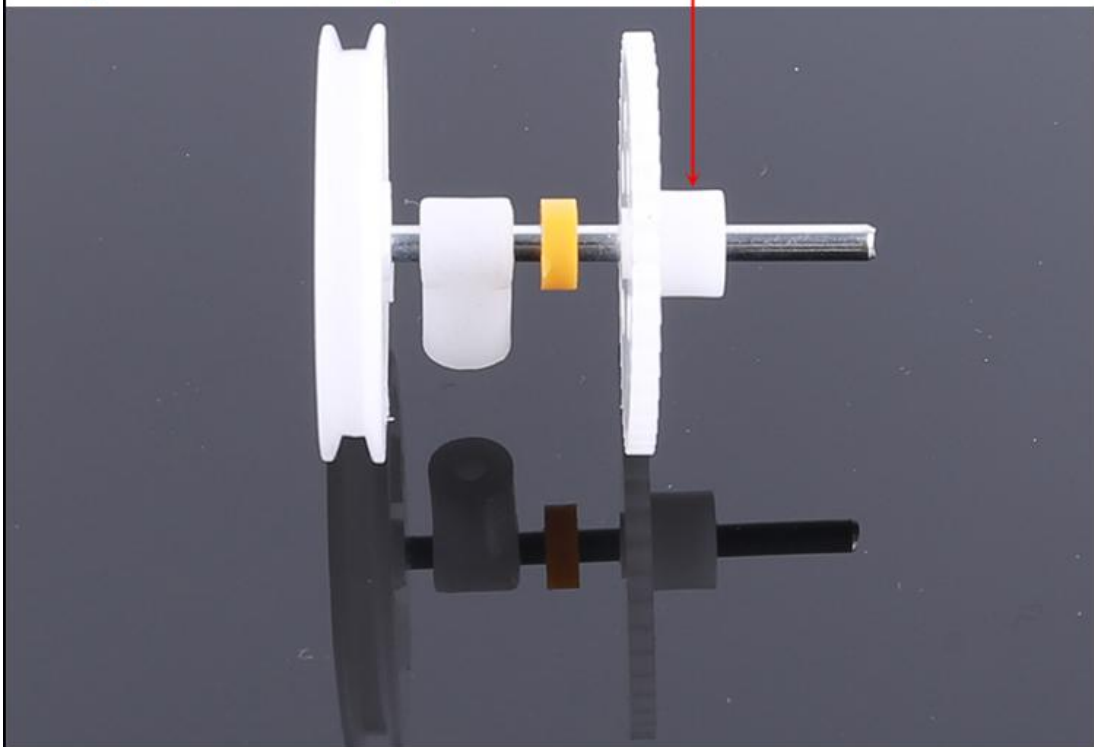
Step 22: Install 1pcs D2.5mm Three-way Sleeve at the end of D2*30mm Axle.
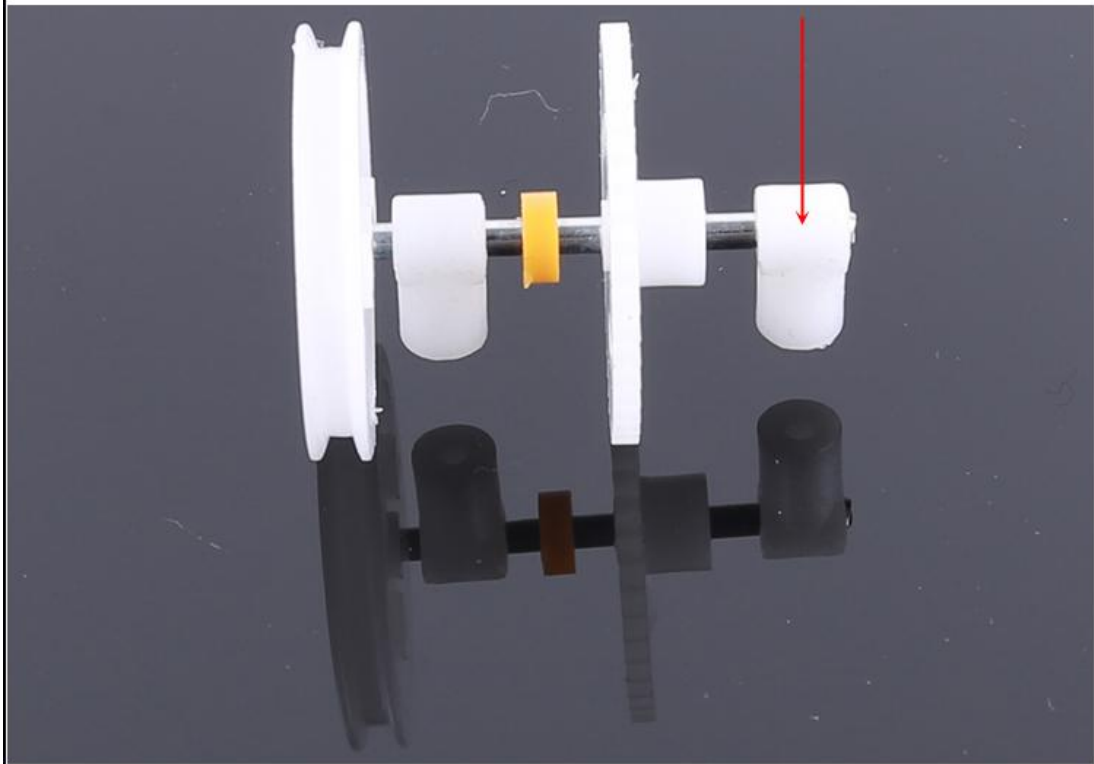
Step 23: Install 1pcs D24mm Tires on D24mm Wheel.

Step 24: Assemble another wheel according to Step 17 ~ Step 22.
Step 25: 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.
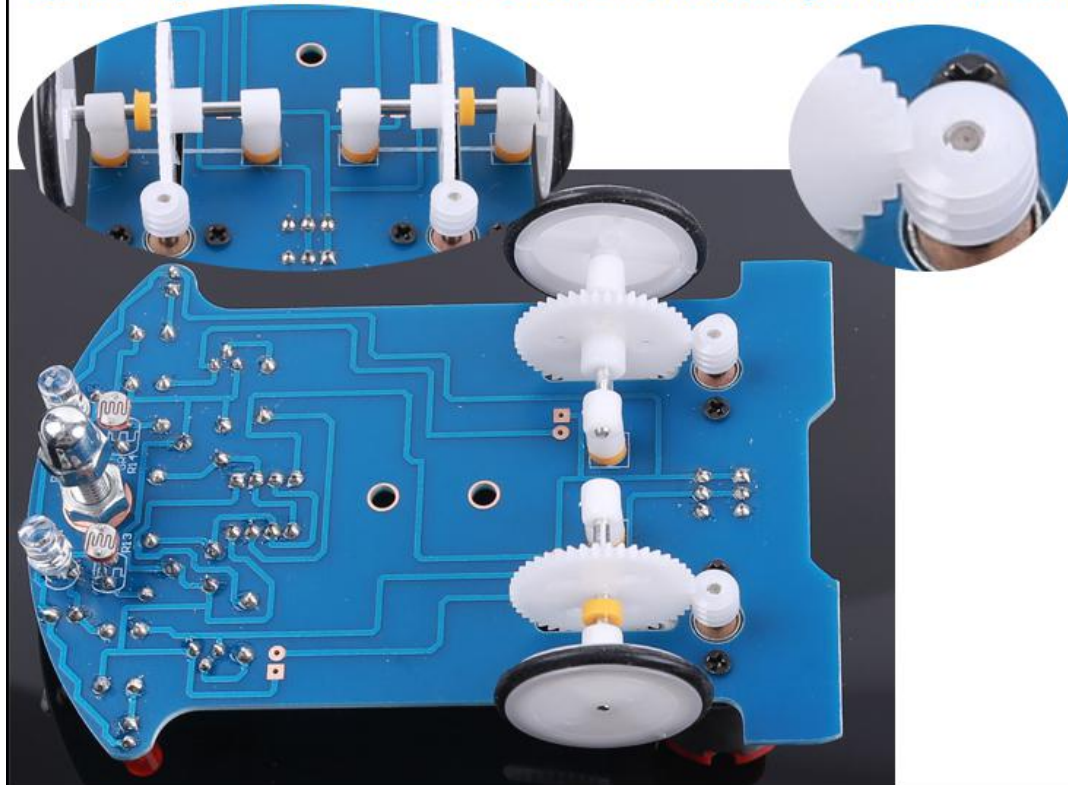
Connection terminal
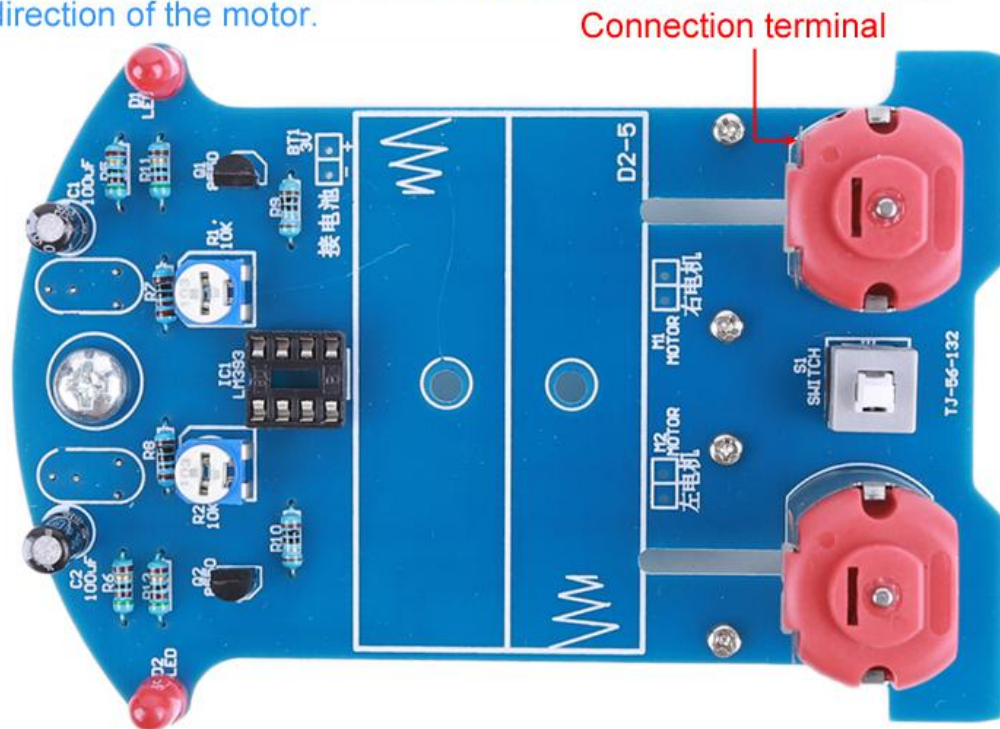
Step 26: Install 2pcs D5mm Worm on motor shaft.
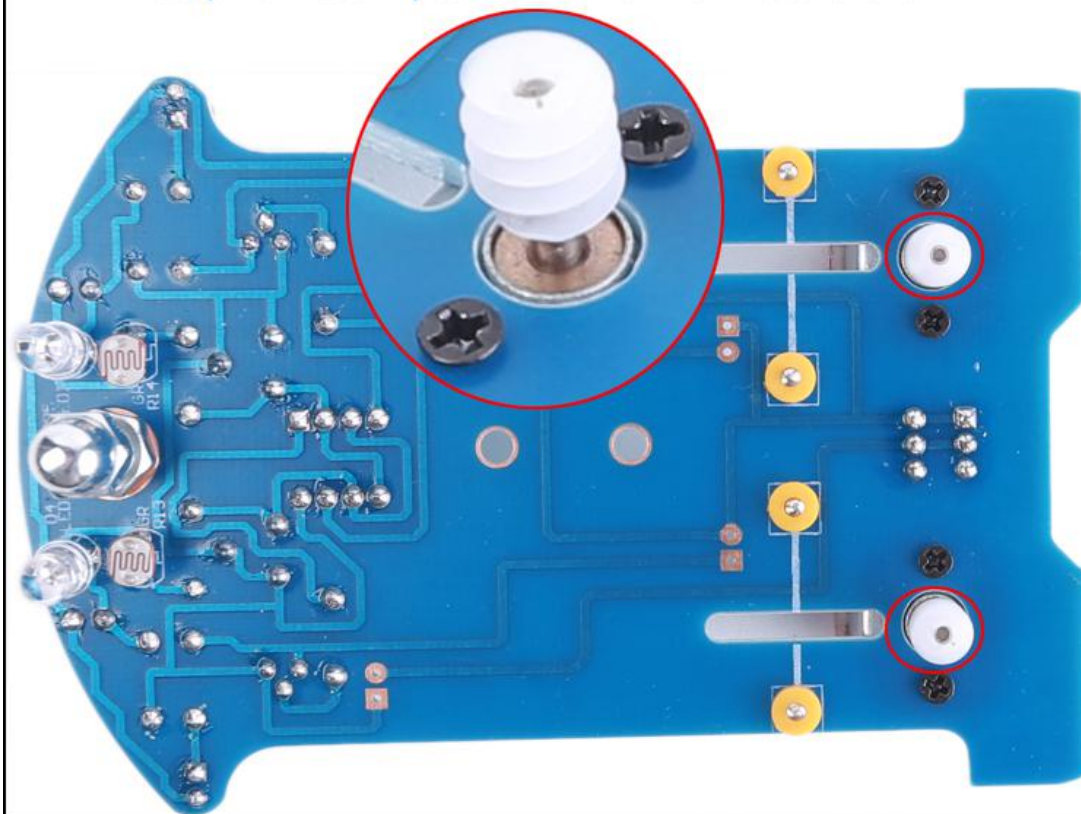
Step 27: Adjust the screw to facilitate subsequent installation (That has be install at Step 18)
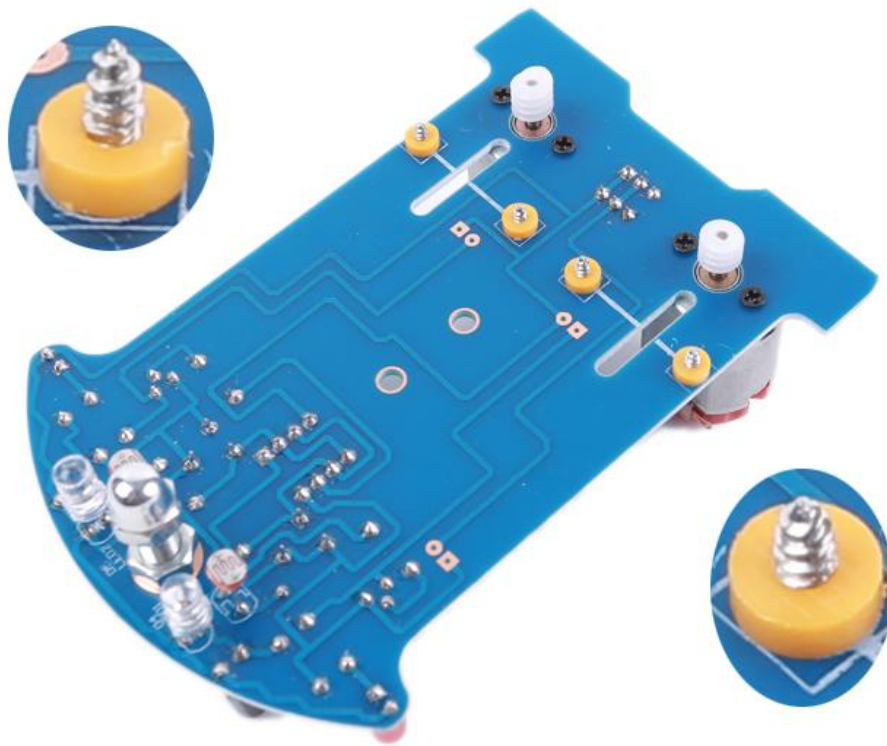
Step 28: Fix the 2pcs assembled wheel on 4pcs D2.0mm Yellow Plastic Spacer.Adjust distance between accessories according to actual situation.
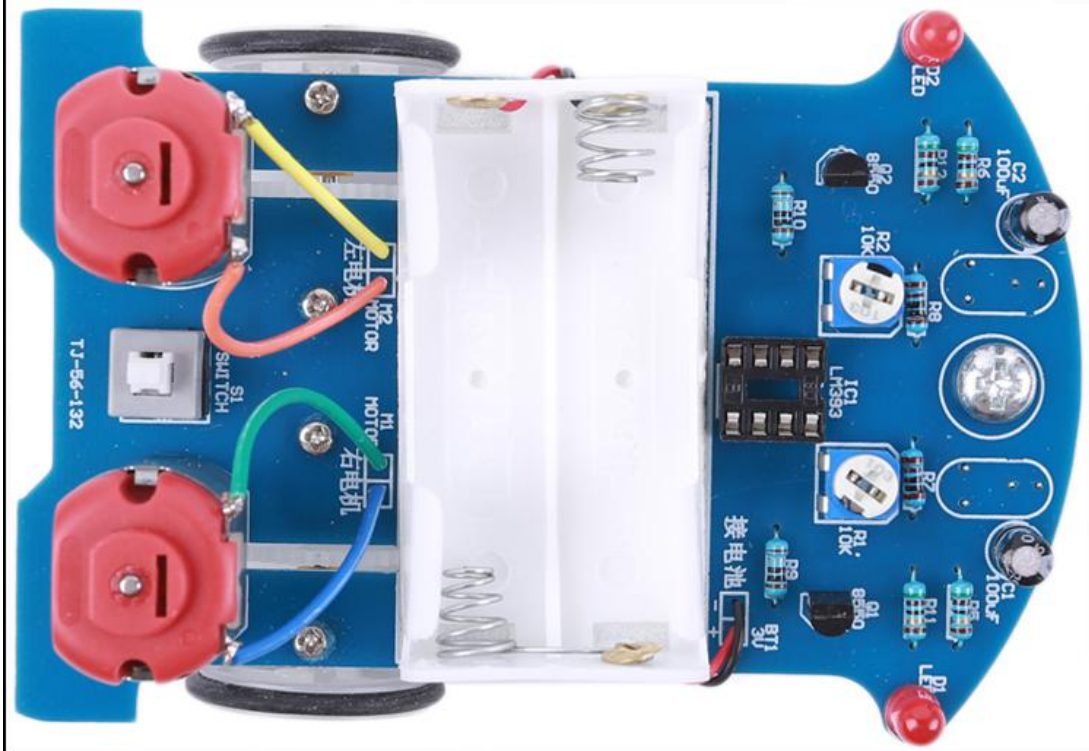
Step 29: Connect four wires to 2pcs motors .Pay attention to the installation sequence of wires and otherwise the car may move abnormally.
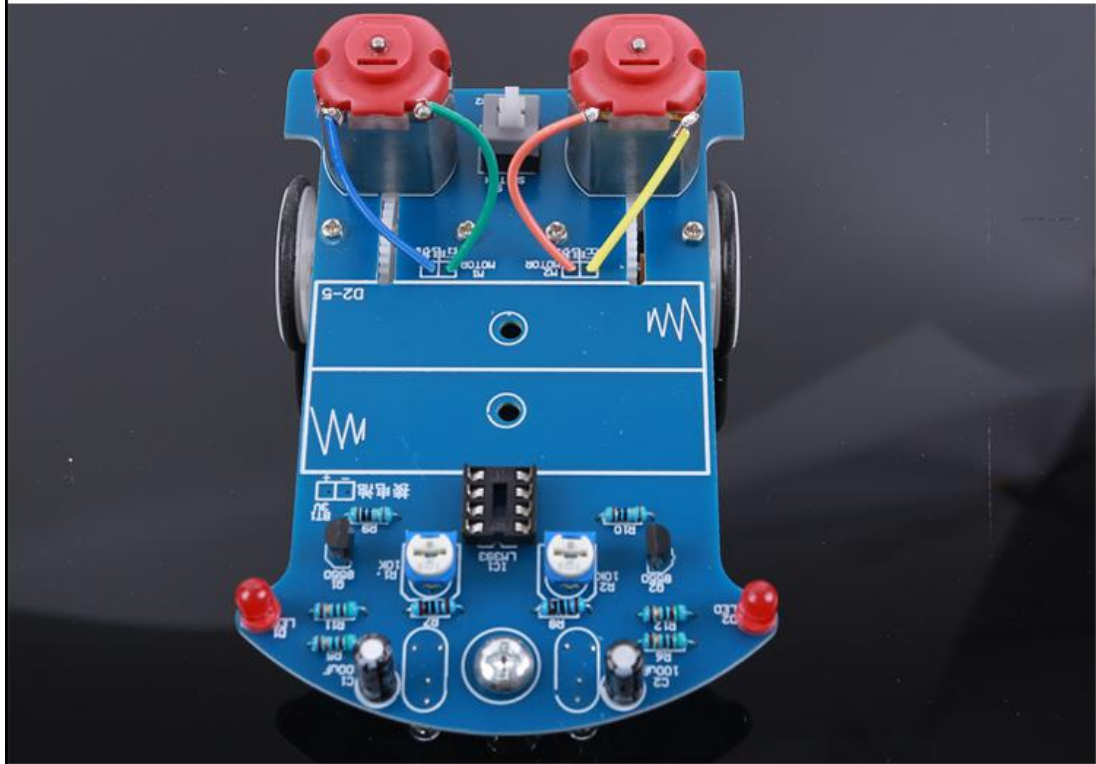

Step 30: Install and fix 1pcs AA*2 Battery Holder. Solder the red and black leads from the battery holder to the pads on the PCB and making sure to put the red wire in the "+" hole and the black wire in the "-" hole.

Step 31: 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 32: 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.

Notch
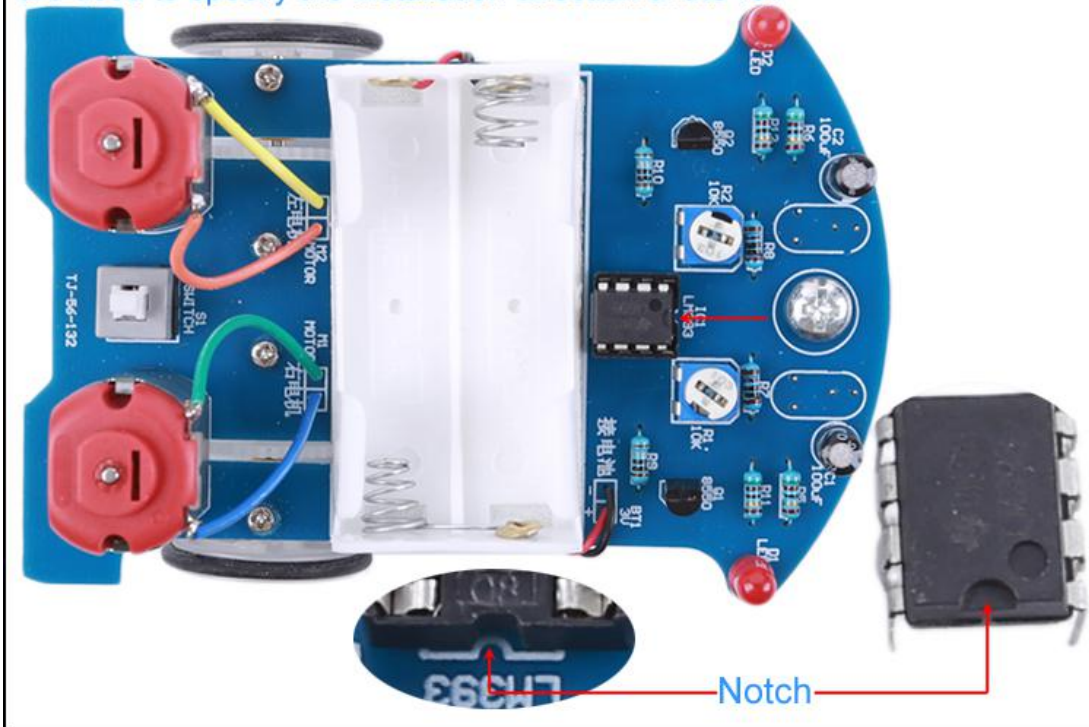
33>.Step 33: Installation Fault debugging:

   33.1>.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.

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

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

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

34>.Step 34: Connect to power supply and enjoy the effect.

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