

## HE013 Magnetic Driven Duckling Car DIY Kit

### 1.Introduction:

HE013 is a Magnetic Driven Duckling Car Circuit Electronic Soldering DIY Kit with RGB LED automatic flashing when running.It is driven by magnetic force, and when the magnet approaches, the car begins to move forward.

It can not only be used as a DIY electronic welding kit that allows you to better understand the circuit and learn how to soldering, but also as a very suitable experimental workbench tool.

### 2.Feature:

- 1>.Magnet Driven
- 2>.RGB LED Automatic Flashing
- 3>.Adjustable RGB LED Brightness
- 4>.DIY Hand Electronic Soldering

### 3.Parameter:

- 1>.Work Voltage: DC 3V
- 2>.Power Type: AA\*2 Battery Box
- 3>.Work Temperature:-40℃~85℃
- 4>.Work Humidity:5%~95%RH
- 5>.Size(Installed):100\*60\*80mm

### 4.Function:

- 1>.ON/OFF Toggle Switch : Power Supply Switch.
- 2>.Potentiometer : Adjustable RGB LED Brightness.
- 3>.The car moves forward and LED starts displaying the breathing light effect when the magnet approaches.
- 4>.LED turn OFF if car stop moves.

### 5.Note:

1>.CC6207TO Hall Sensor must be placed next to the smallest Round Magnet, otherwise LED will not flashing normally.

### 6.Component Listing:

NO.	Component Name	PCB Marker	Parameter	QTY
1	STC8G1K17A-36I MCU Controller	U4	DIP-8	1
2	IC Socket	U4	DIP-8	1
3	CC6207TO Hall Sensor	U1,U2	TO-92	2
4	Metal Film Resistor	R1	5.1Kohm	1
5	Ceramic Capacitor	C5	0.1UF 104	1
6	Monolithic Capacitor	C2	10uF 106	1
7	Electrolytic Capacitor	C1	22uF 16V 4*7mm	1
8	Electrolytic Capacitor	C6	47uF 16V 4*7mm	1
9	1N5819 Schottky Diode	D1	DO-41	1
10	RGB LED Flash Fast	LED1-LED11	RGB 5mm	11
11	SK12D07VG3 Toggle Switch	SW1	5Pin	1
12	QX2303L50TO 5V Power Converter	U3	TO-92	1
13	RV0931 Potentiometer	R3	1K	1
14	47uH Inductor	L1	8*10mm	1
15	Yellow Limiting Washer	/	D2mm	4
16	Metal Shaft	/	D2mm*L60mm	2
17	Rubber Ring Wheels	/	D30mm	4
18	Round Magnet	/	D2mm*H2mm	2
19	Ring Magnet	/	D12*H4*14mm	1

20	Ring Magnet	/	D15*H4*14mm	2
21	Battery Box	/	AA*2	1
22	M3 Nut	/	/	4
23	M3*6mm Screw	/	/	2
24	M3*8mm Screw	/	/	2
25	PCB HE013-A Circuit Board	/	100*60*1.6mm	1
26	PCB HE013-B Circuit Board	/	70*25*1.6mm	1
27	PCB HE013-C Circuit Board	/	70*25*1.6mm	1
28	PCB HE013-D Circuit Board	/	63*54*1.6mm	1
29	PCB HE013-E Circuit Board	/	40*16*1.6mm	1
30	PCB HE013-F Circuit Board	/	100*20*1.6mm	1

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

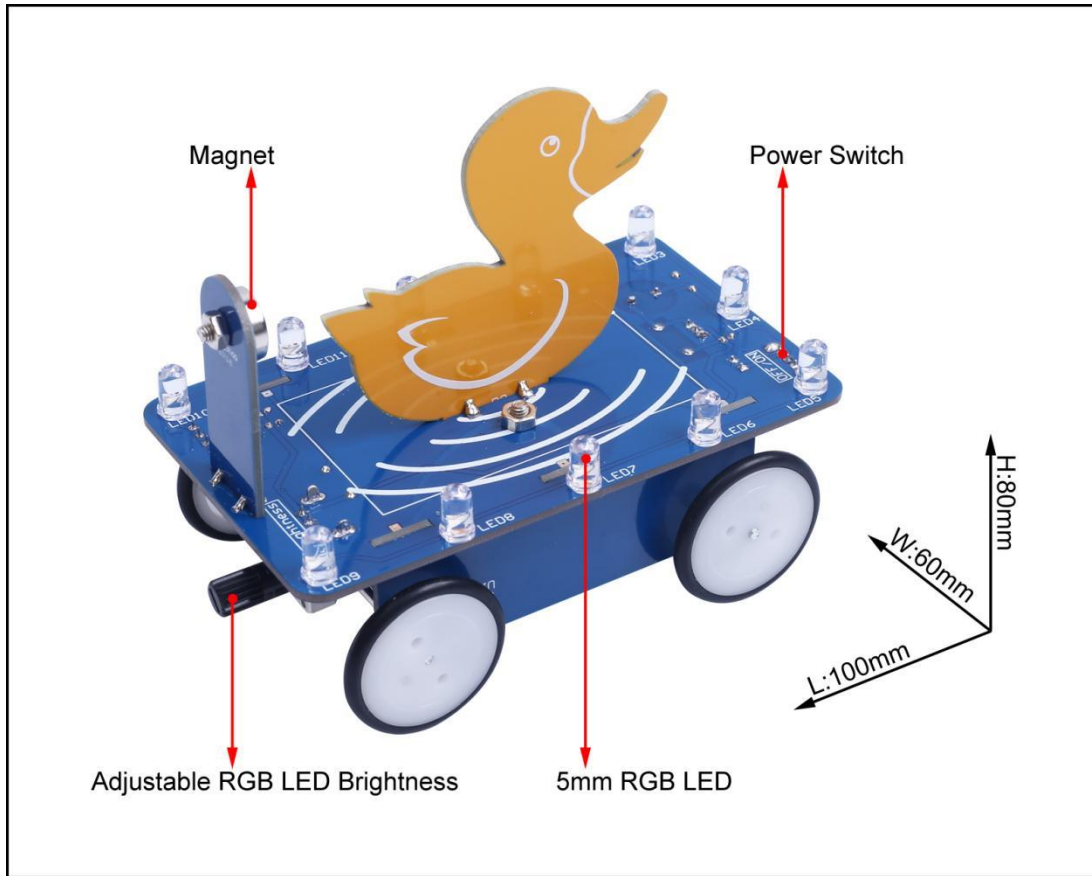
### 7.Application:

- 1>.Training welding skills
- 2>.Student school
- 3>.DIY production
- 4>.Project Design
- 5>.Electronic competition
- 6>.Gift giving
- 7>.Crafts collection
- 8>.Home decoration
- 9>.Souvenir collection
- 10>.Graduation design
- 11>.Holiday gifts

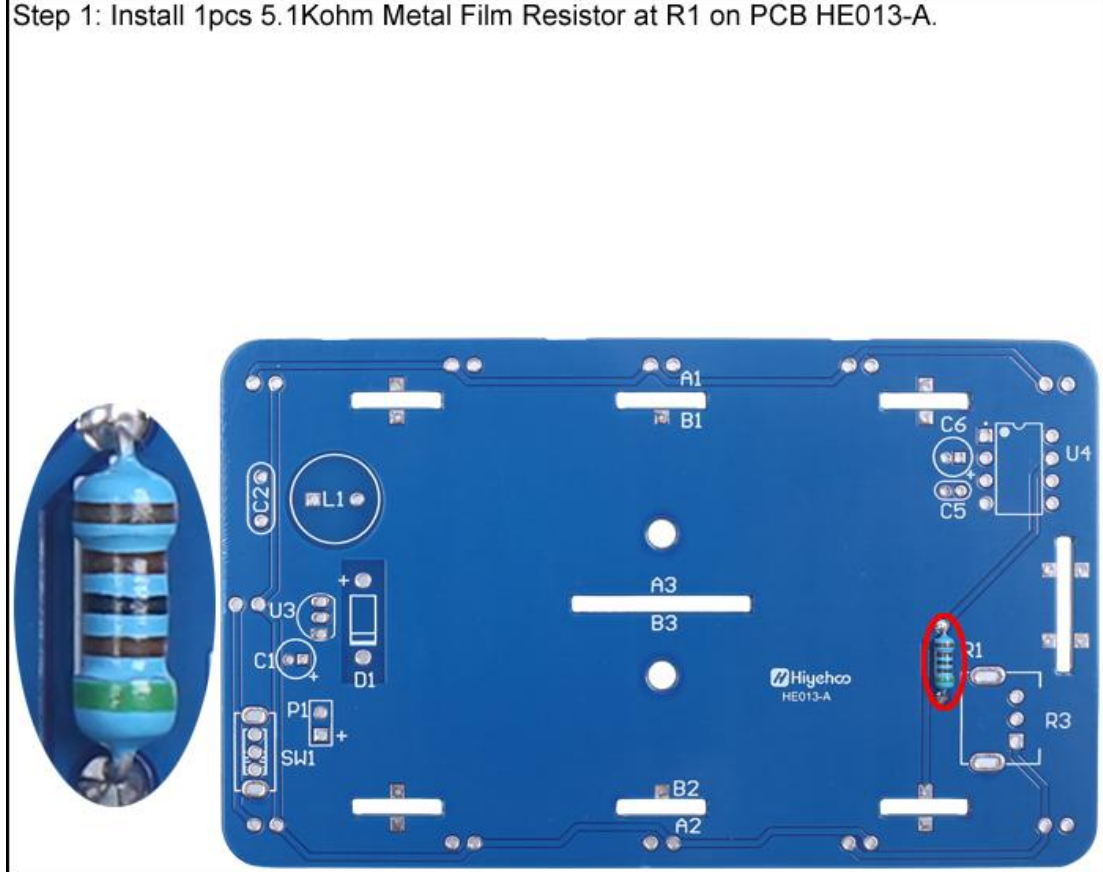
### 8.Installation Tips:

- 1>.User needs to prepare the welding 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>.Soldering iron can't touch components for a long time(1.0s), otherwise it will damage 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.

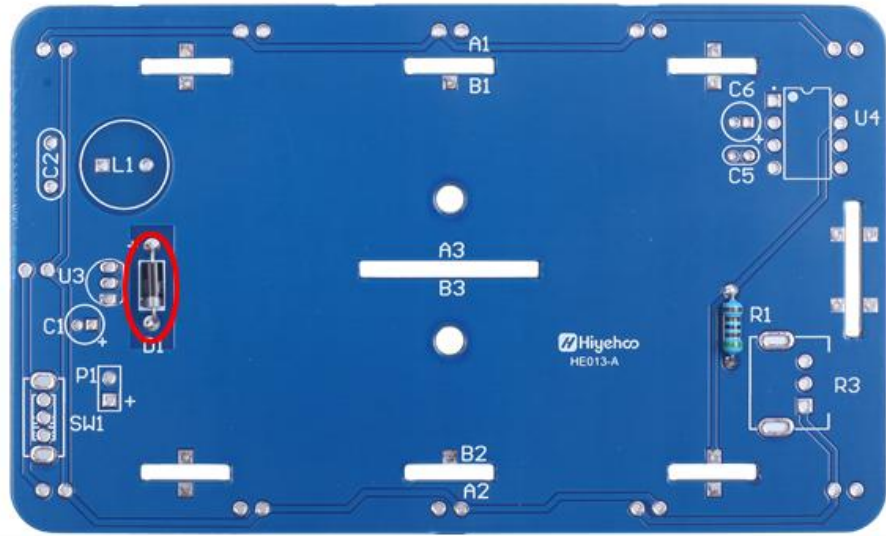
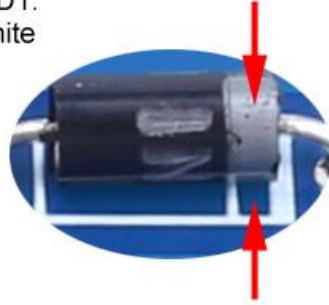
### 9.Installation Steps(Please be patient install!!!):



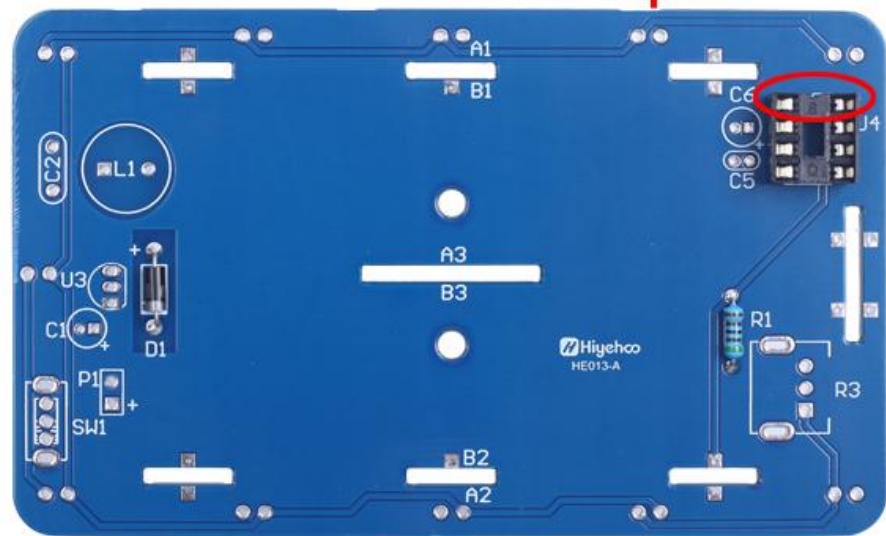
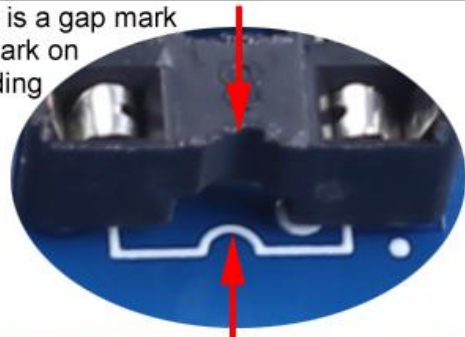
Step 1: Install 1pcs 5.1Kohm Metal Film Resistor at R1 on PCB HE013-A.



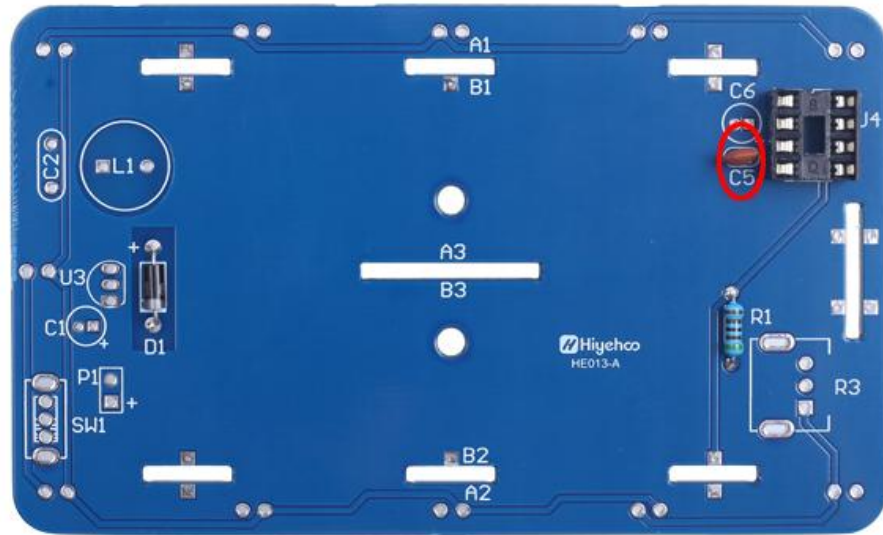
Step 2: Install 1pcs DO-41 1N5819 Schottky Diode at D1. Pay attention to the installation direction. There is a white mark on 1N5819 and a white mark on PCB which are used to confirm the installation direction.



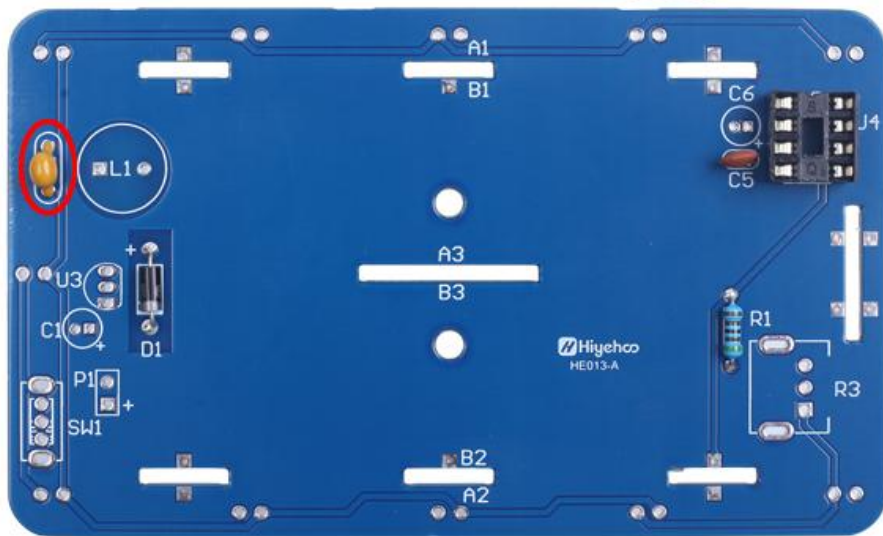
Step 3: Install 1pcs DIP-8 IC Socket at U4. There is a gap mark on one end of the IC Socket and there is a gap mark on PCB silk screen. These two marks are corresponding to each other and are used to specify the installation direction of the IC Socket.



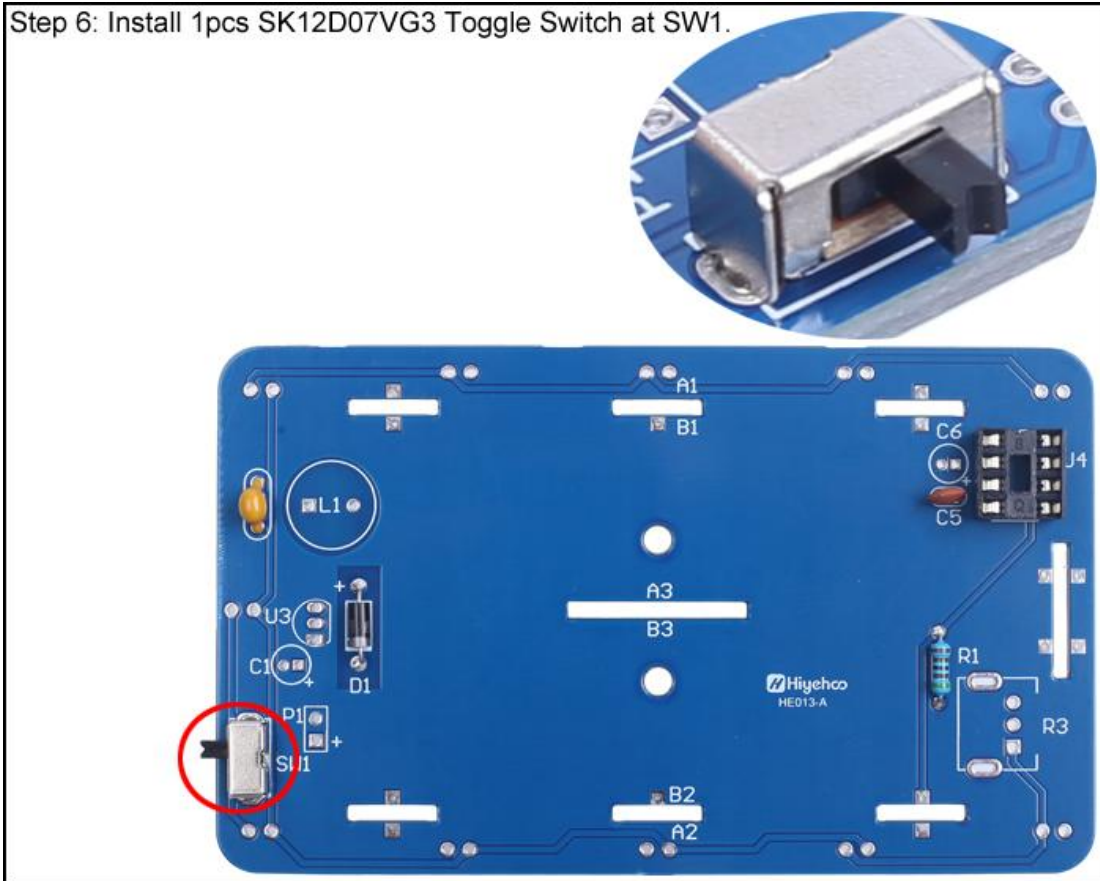
Step 4: Install 1pcs 1uF(105) Ceramic Capacitor at C5.



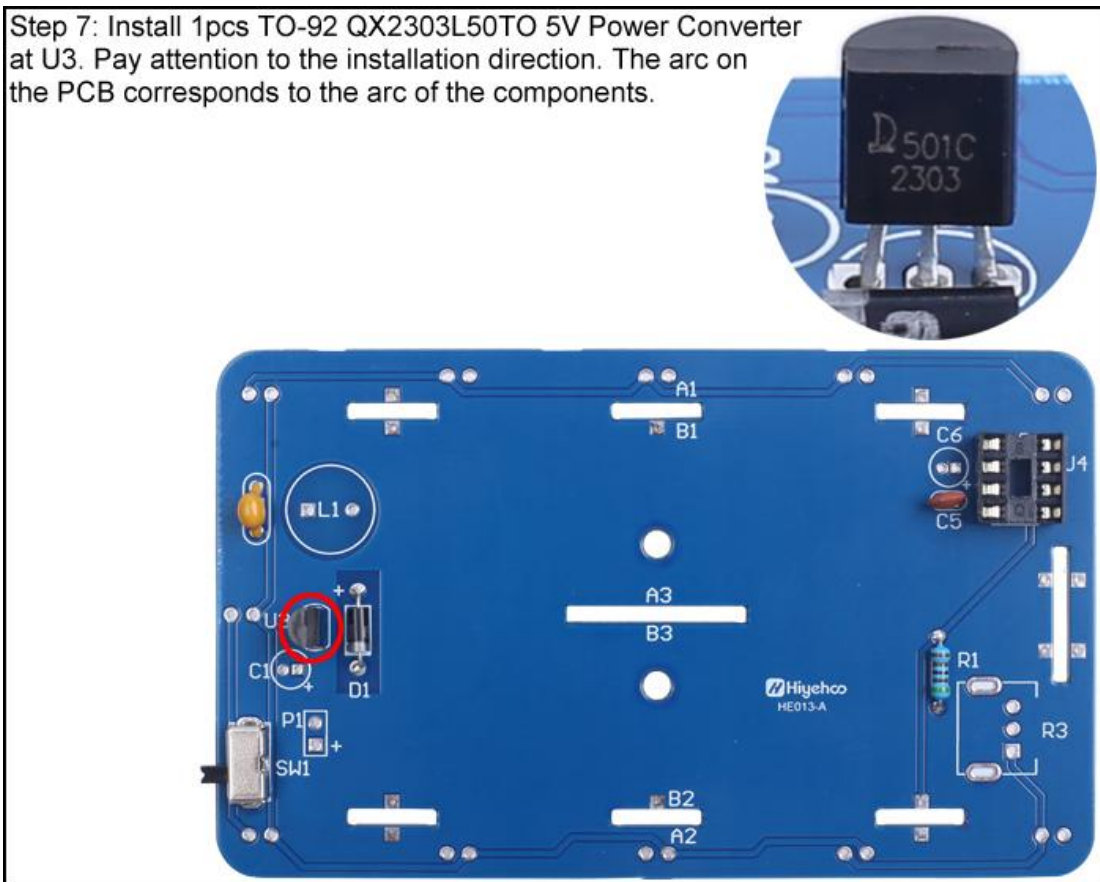
Step 5: Install 1pcs 10uF(106) Monolithic Capacitor at C2.



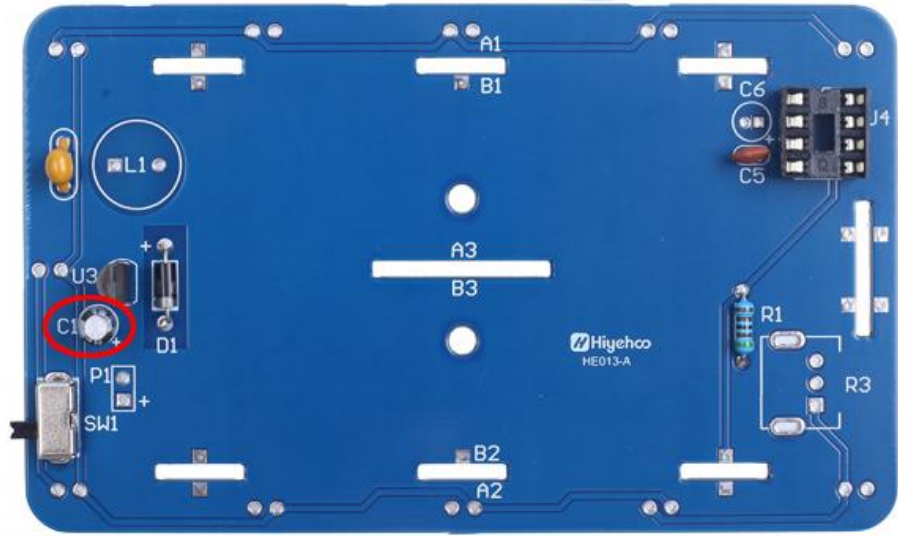
Step 6: Install 1pcs SK12D07VG3 Toggle Switch at SW1.



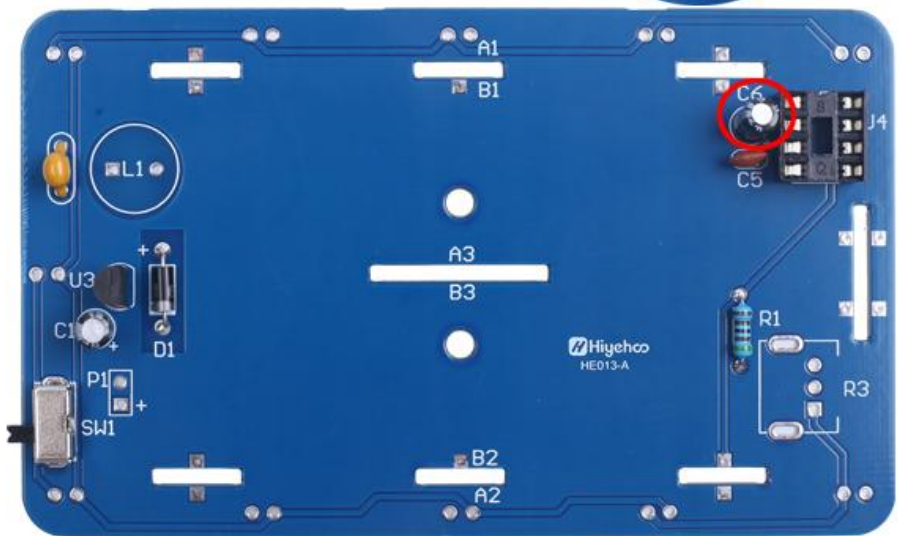
Step 7: Install 1pcs TO-92 QX2303L50TO 5V Power Converter at U3. Pay attention to the installation direction. The arc on the PCB corresponds to the arc of the components.



Step 8: Install 1pcs 22uF 16V Electrolytic Capacitor at C1.  
The Longer pin is positive pole connect to '+' pad.



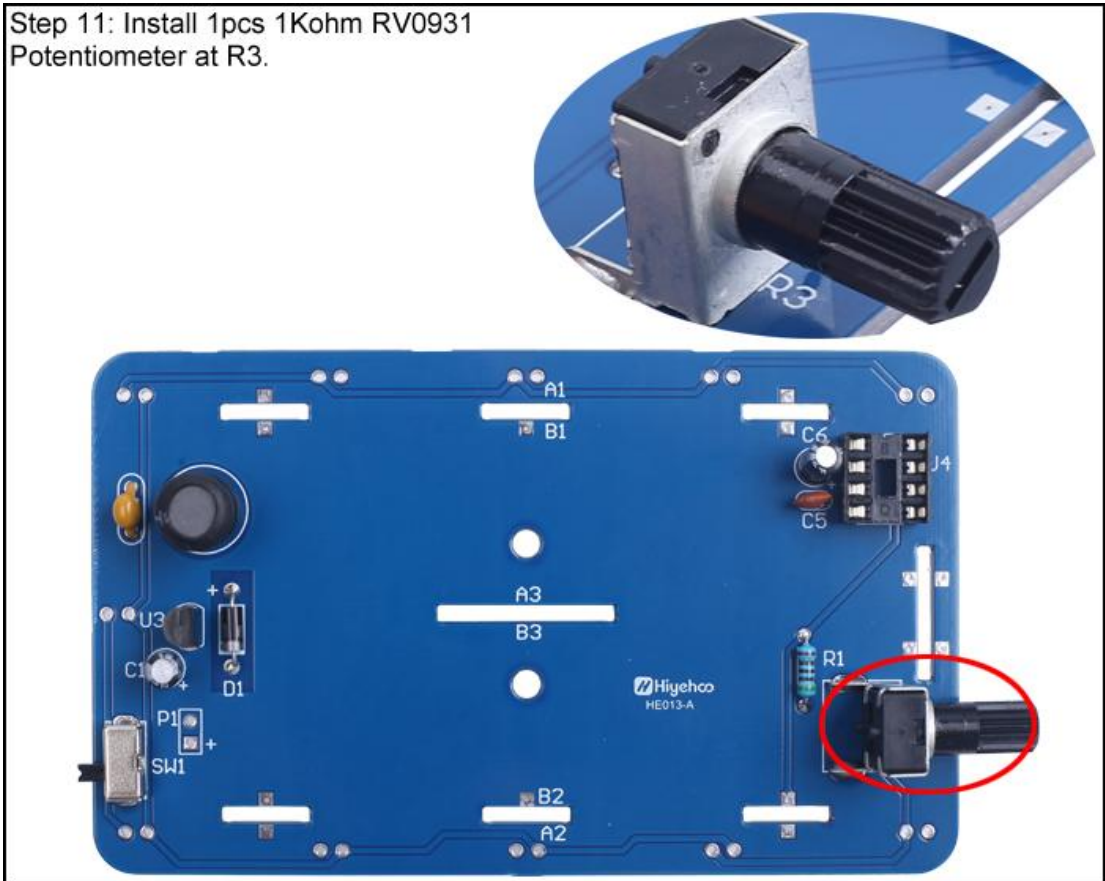
Step 9: Install 1pcs 47uF 16V Electrolytic Capacitor at C6.  
The Longer pin is positive pole connect to '+' pad.



Step 10: Install 1pcs 8\*10mm 47uH Inductor at L1.

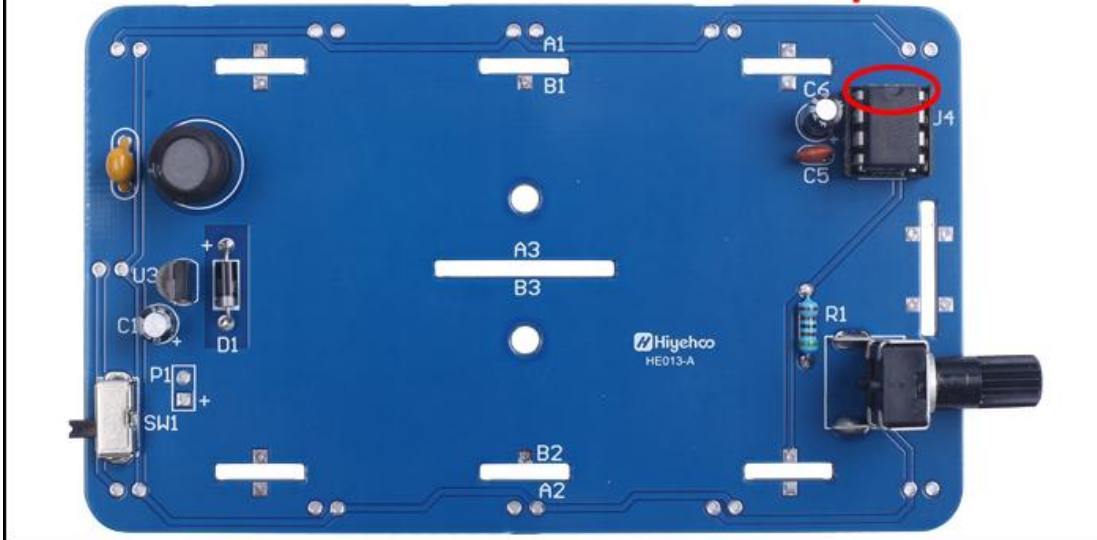


Step 11: Install 1pcs 1Kohm RV0931 Potentiometer at R3.





Step 12: Install 1pcs DIP-8 STC8G1K17A-36I MCU Controller at U4. There is a gap mark on one end of the IC and a gap mark on IC Socket. These two marks are corresponding to each other and are used to specify the installation direction of the IC.

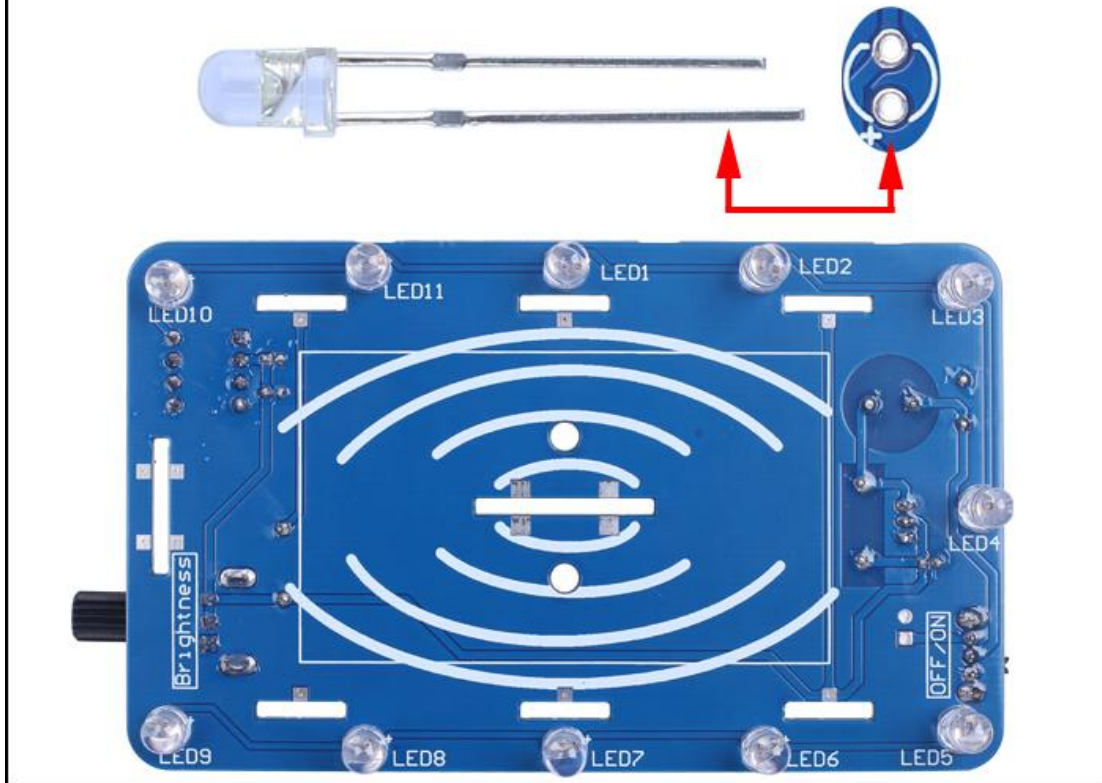


Step 13: Identify the positive(anode) and negative(cathode) lead of LED. The leads of the LED must be installed correctly, otherwise the LED cannot be turned on. Here are four methods as following:

- 13.1>.According to the length of the LED lead to distinguish. The longer pin is positive(anode) lead. The shorter pin is negative(cathode) lead.
- 13.2>.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.
- 13.3>.Identify by edge of plastic case. The negative(cathode) lead of the LED should be the pin nearest the flat on the plastic case.
- 13.4>.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)
- 13.5>.Note:If the flat on 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.



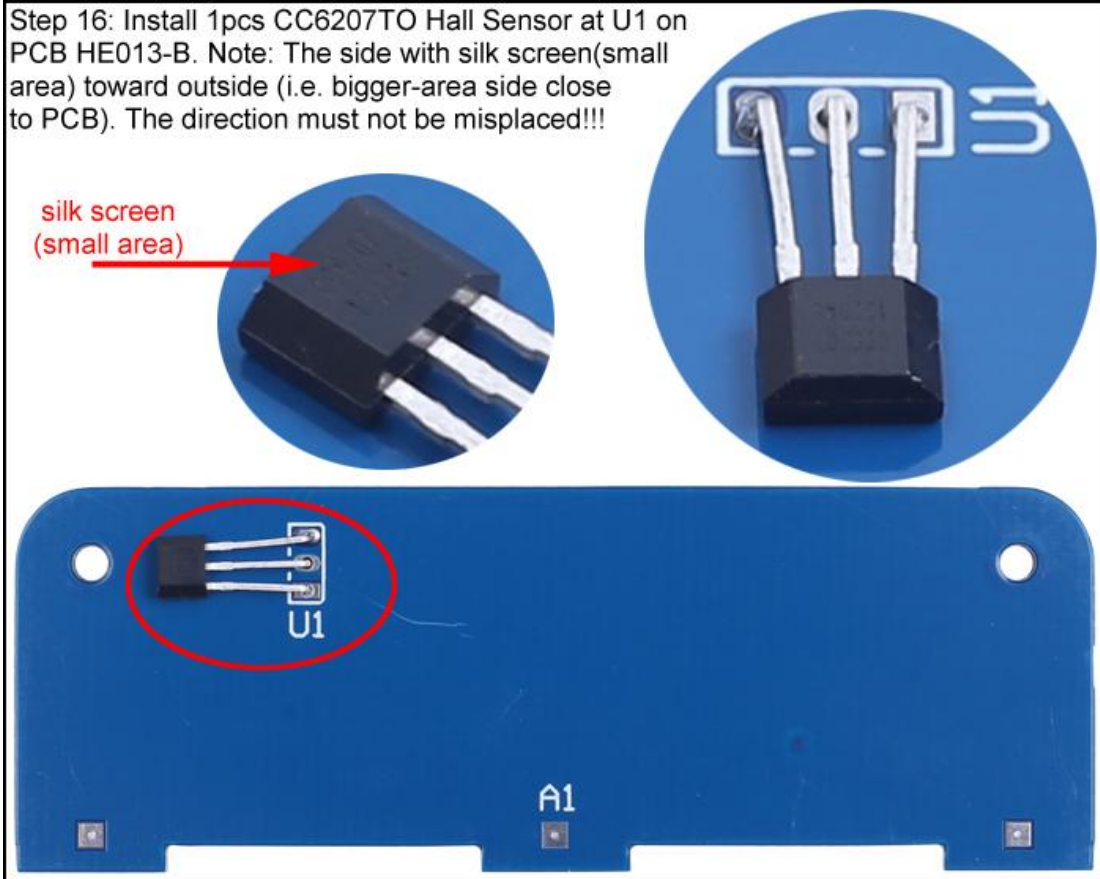
Step 14: Install 11pcs 5mm RGB LED Flash Fast at LED1-LED11 on PCB another side. The Longer pin is positive pole connect to '+' pad.



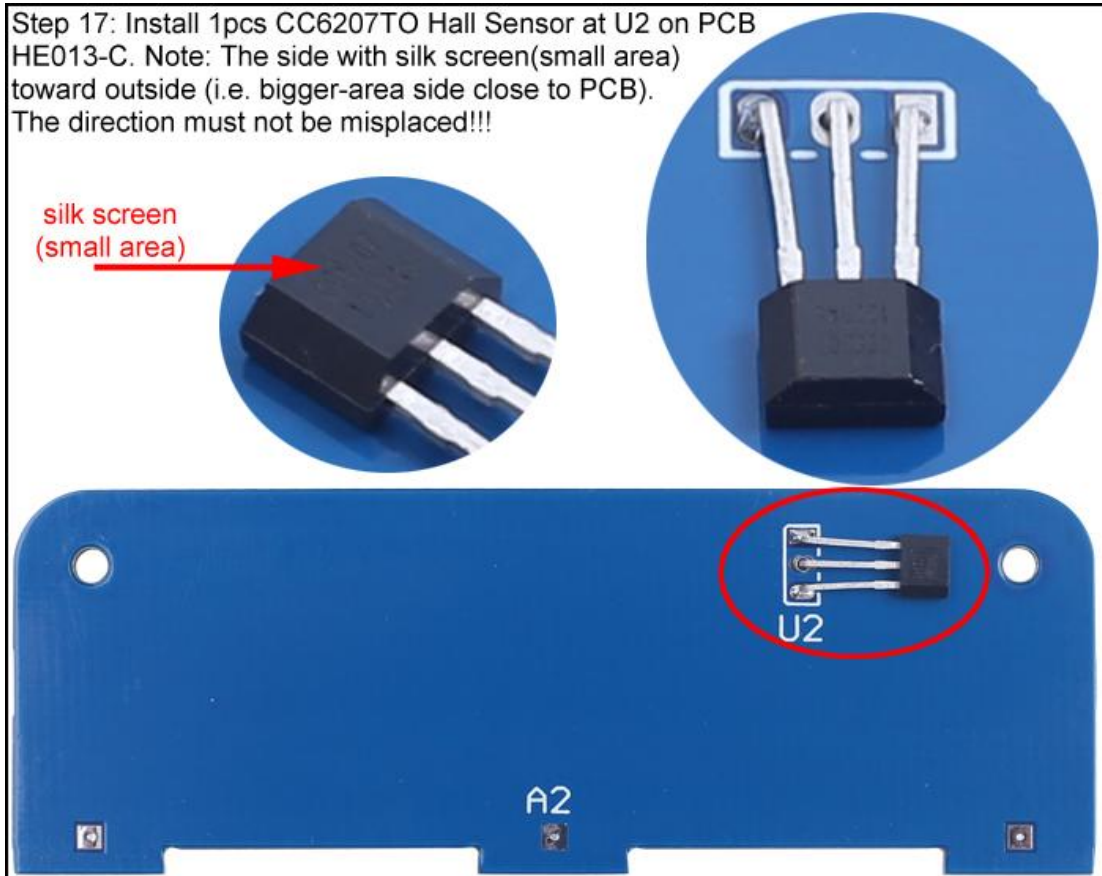
Step 15: Bend CC6207TO Hall Sensor's Pin about 6cm. Bend towards bigger-area side.



Step 16: Install 1pcs CC6207TO Hall Sensor at U1 on PCB HE013-B. Note: The side with silk screen (small area) toward outside (i.e. bigger-area side close to PCB). The direction must not be misplaced!!!



Step 17: Install 1pcs CC6207TO Hall Sensor at U2 on PCB HE013-C. Note: The side with silk screen (small area) toward outside (i.e. bigger-area side close to PCB). The direction must not be misplaced!!!

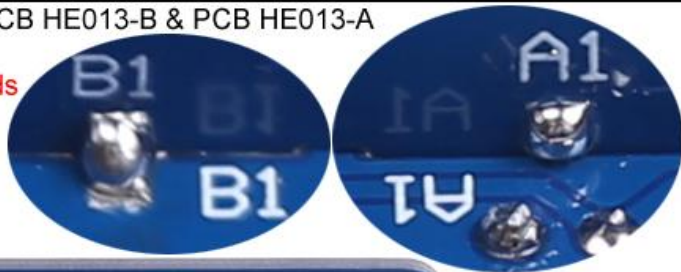


Step 18: Place tin at 6 pads as showing on PCB HE013-B and HE013-C.



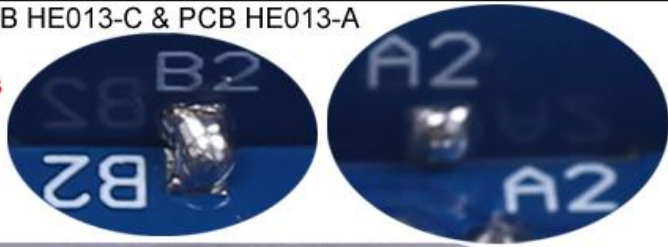
Step 19: Splicing & alignment PCB HE013-B & PCB HE013-A by pad and tin.

Note: 'A1' pad connect to A1 pads and B1 to B1 pads. Ensure that the two PCB are perpendicular to each other.



Step 20: Splicing & alignment PCB HE013-C & PCB HE013-A by pad and tin.

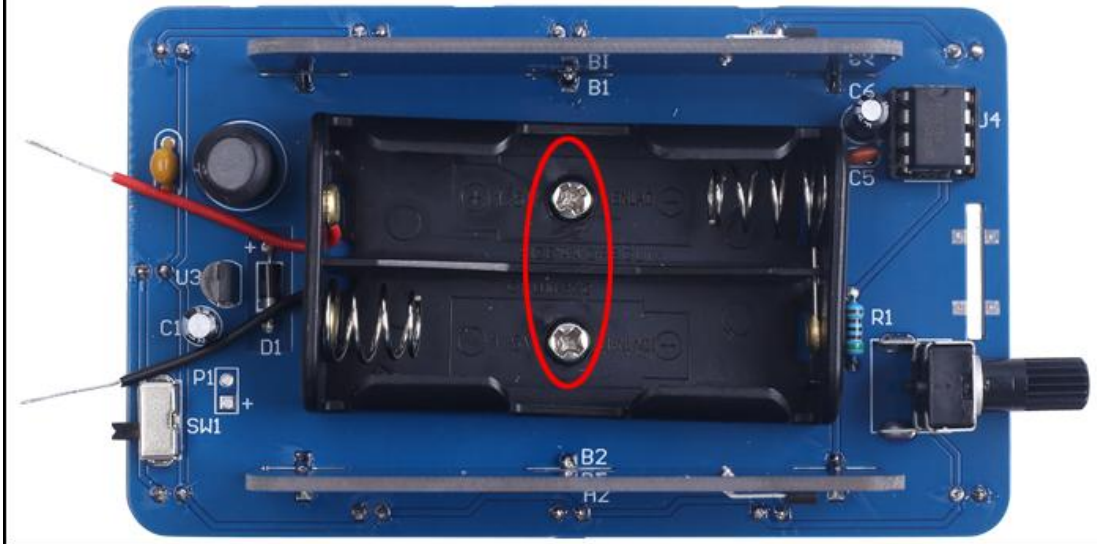
Note: 'A2' pad connect to A2 pads and B2 to B2 pads. Ensure that the two PCB are perpendicular to each other.



Step 21: Cut and keep about 5cm wire from AA\*2 Battery Box.



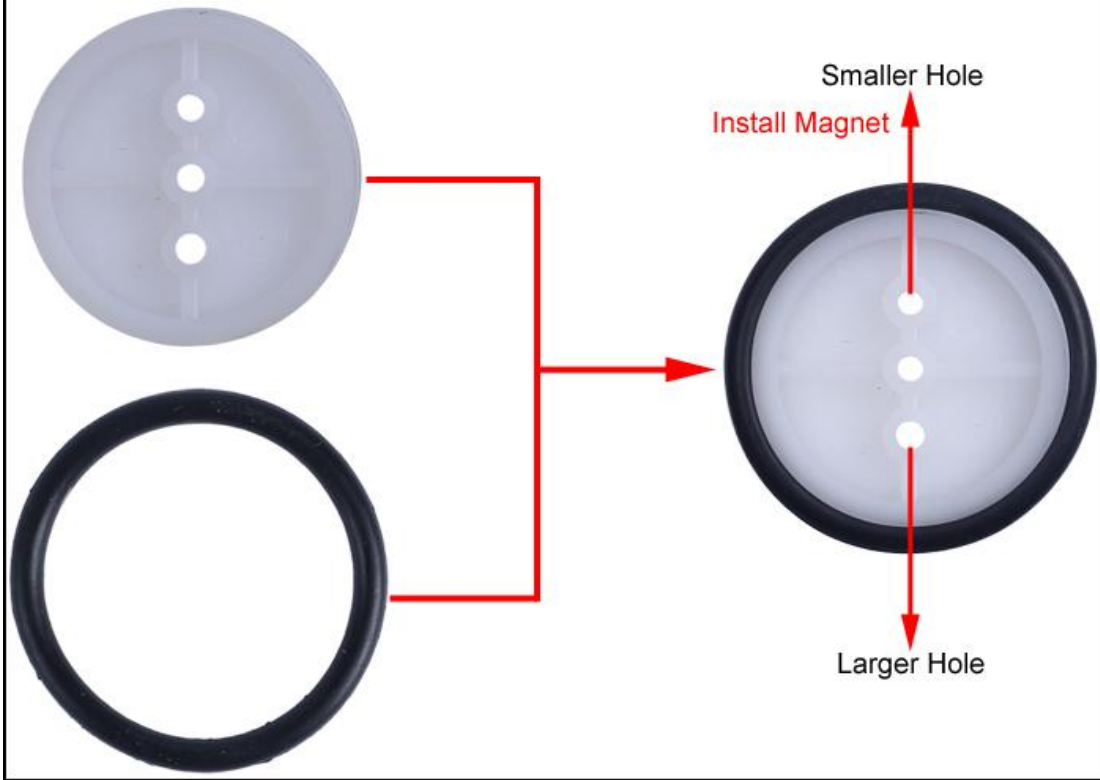
Step 22: Fix AA\*2 Battery Box by M3\*7mm nylon screw and M3 Nut.



Step 23: Connect AA\*2 Battery Box to P1. Red wire connect to '+' pad.



Step 24: Install or ensure black tires has been installed on the wheels.  
Find a relatively small installation hole.



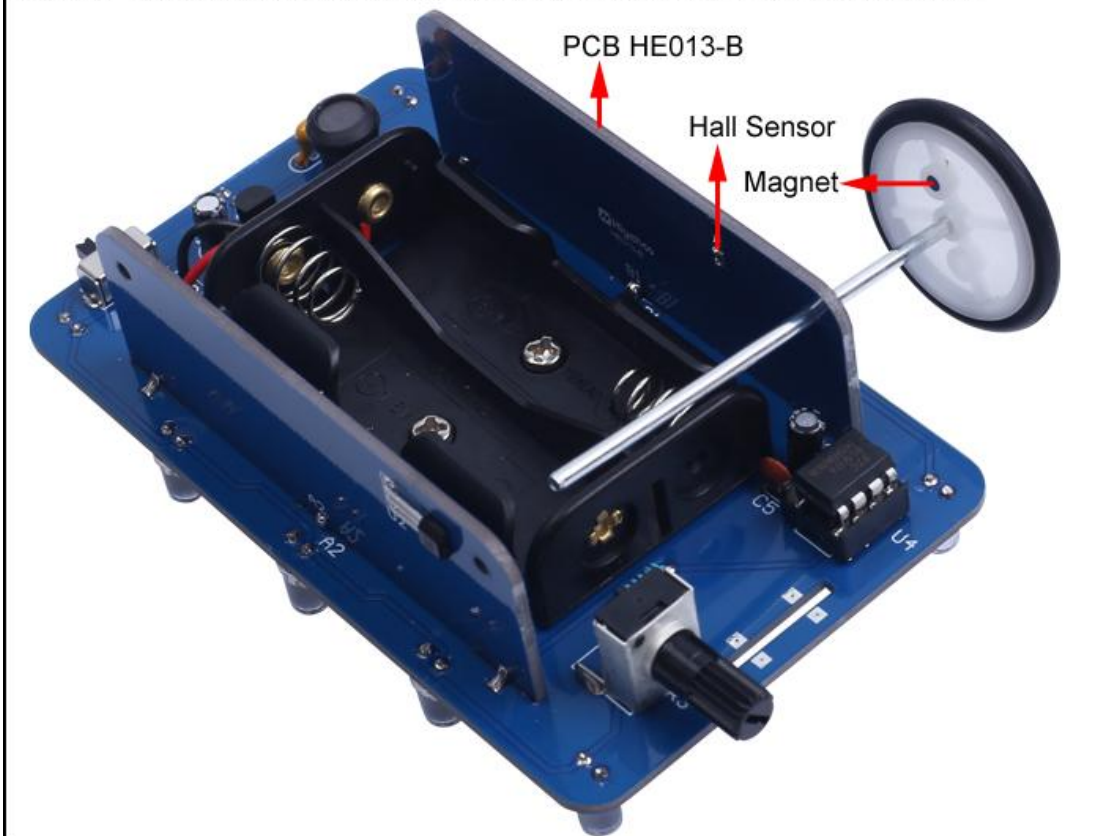
Step 25: Install 1pcs D2mm\*H2mm Round Magnet on the smaller hole on 1pcs Rubber Ring Wheels. Note: the hole is relatively small, so it is necessary to use tools to press the magnet into hole. The same method for another Rubber Ring Wheel.



Step 26: Fix 1pcs Rubber Ring Wheels **with** Round Magnet on the end of D2mm\*L60mm Metal Axis. Note: Magnet and Axis in the same side.

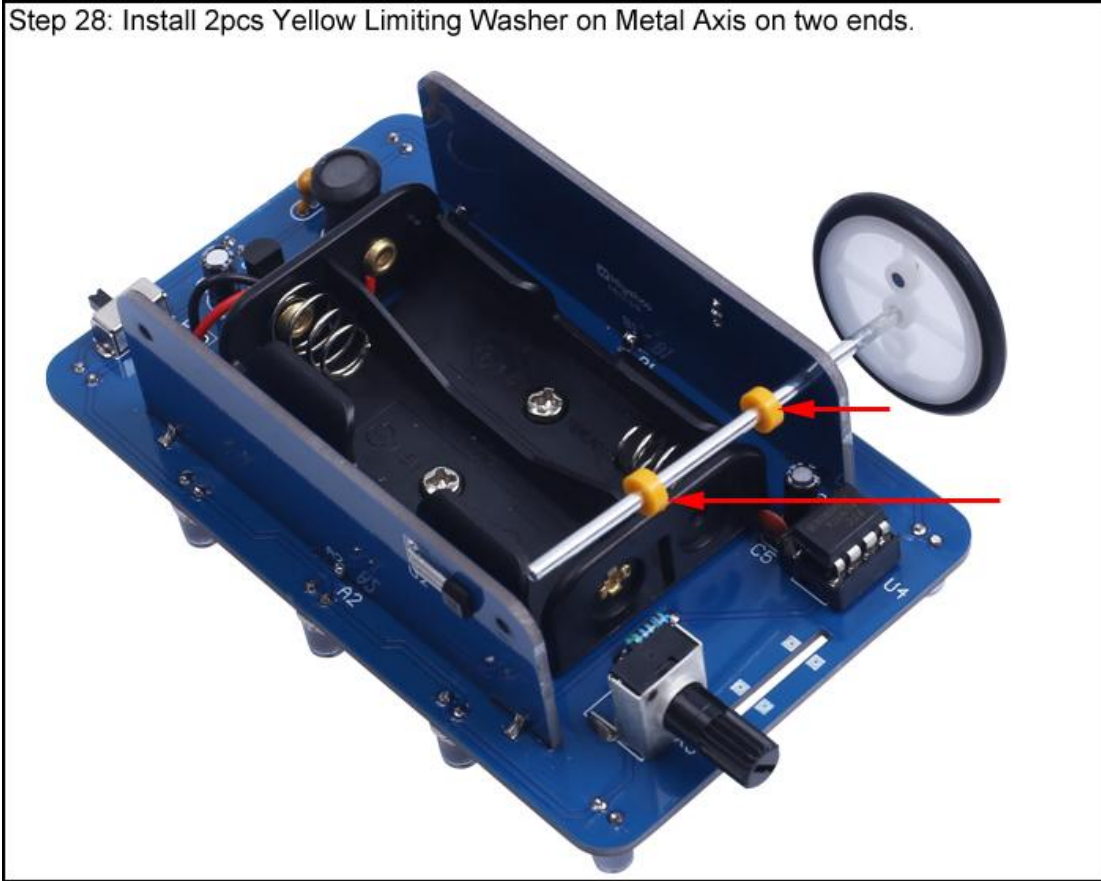


Step 27: Thread this metal shaft through a hole next to U1 on PCB HE013-B.

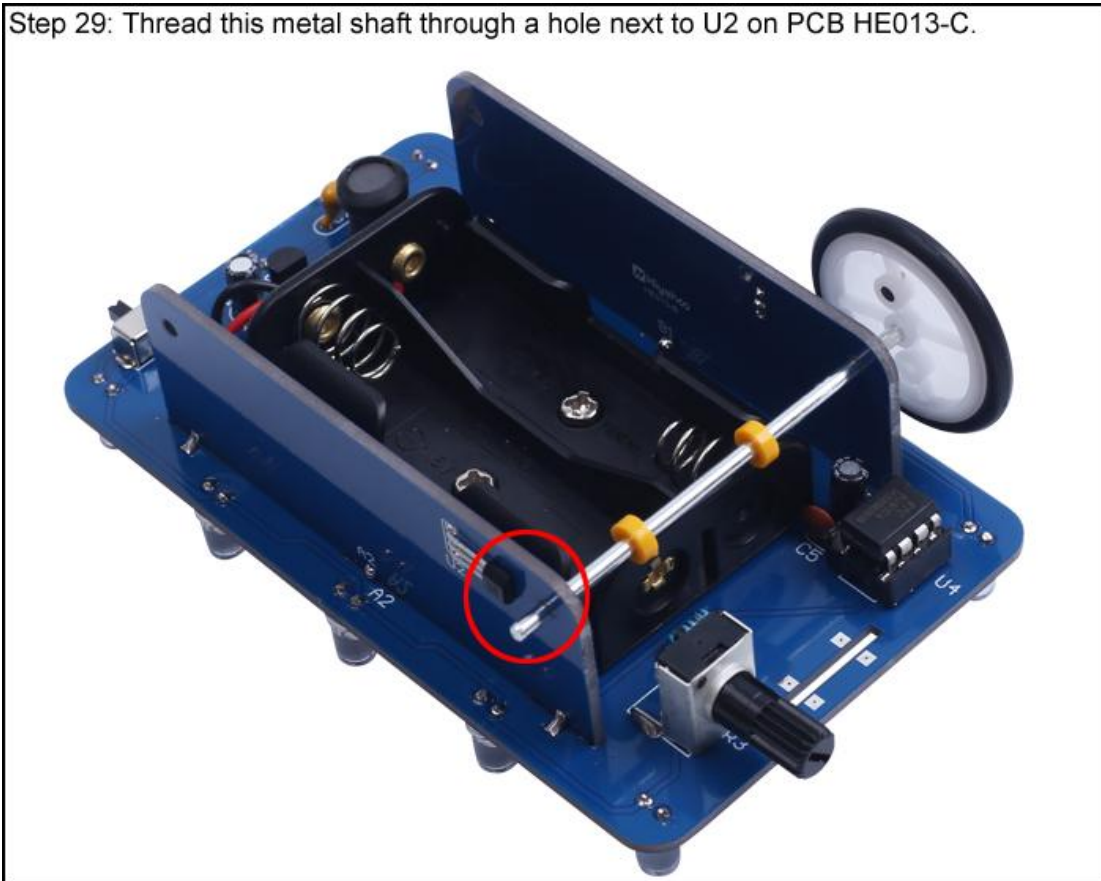




Step 28: Install 2pcs Yellow Limiting Washer on Metal Axis on two ends.



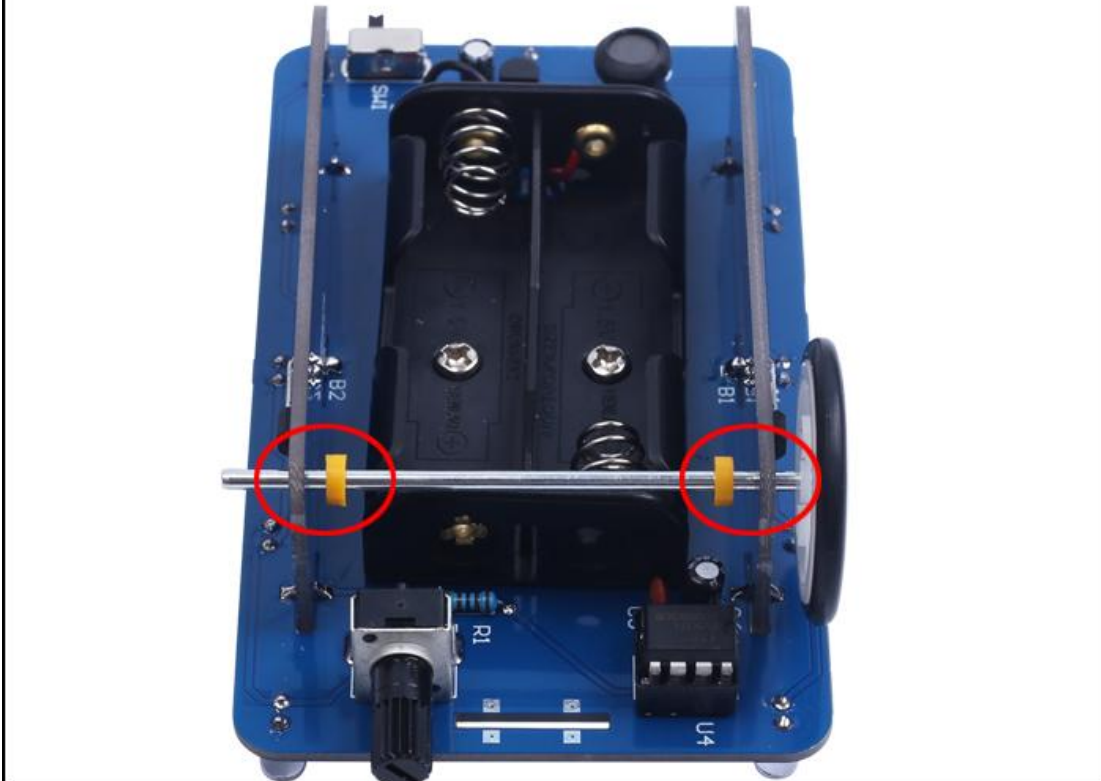
Step 29: Thread this metal shaft through a hole next to U2 on PCB HE013-C.



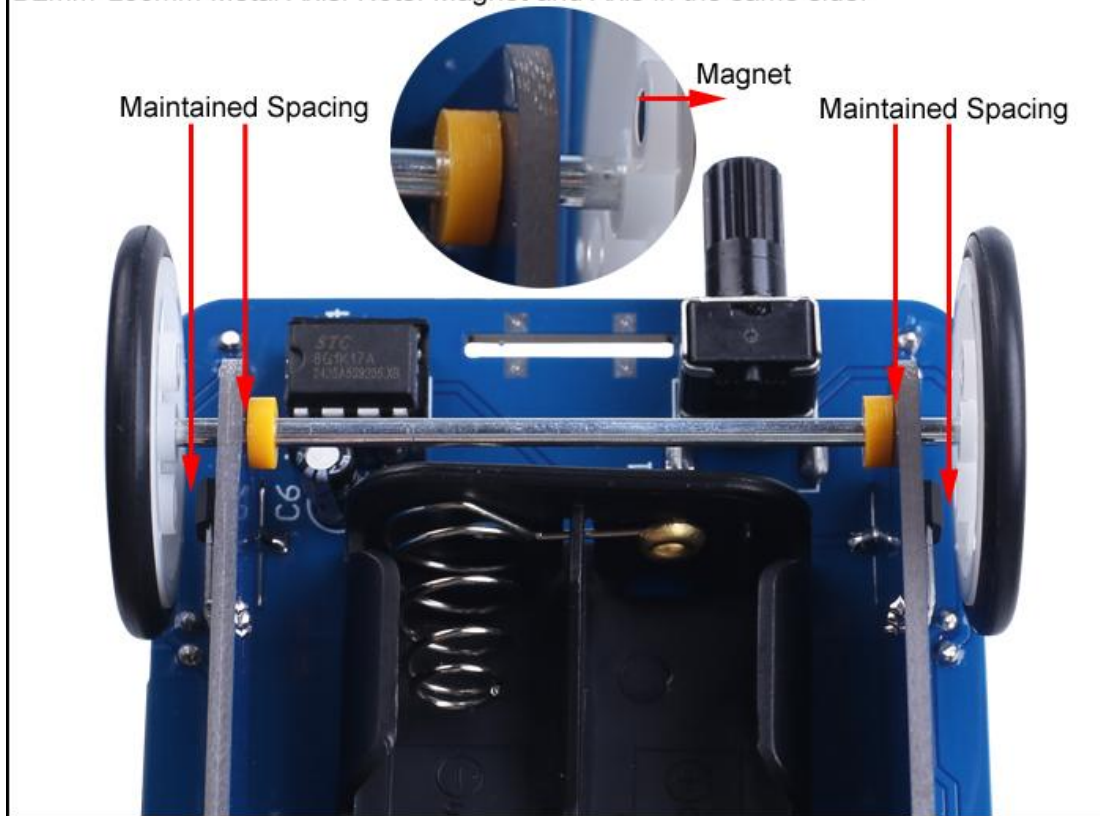
Step 30: Move Yellow Limiting Washer to a suitable location by tweezers.



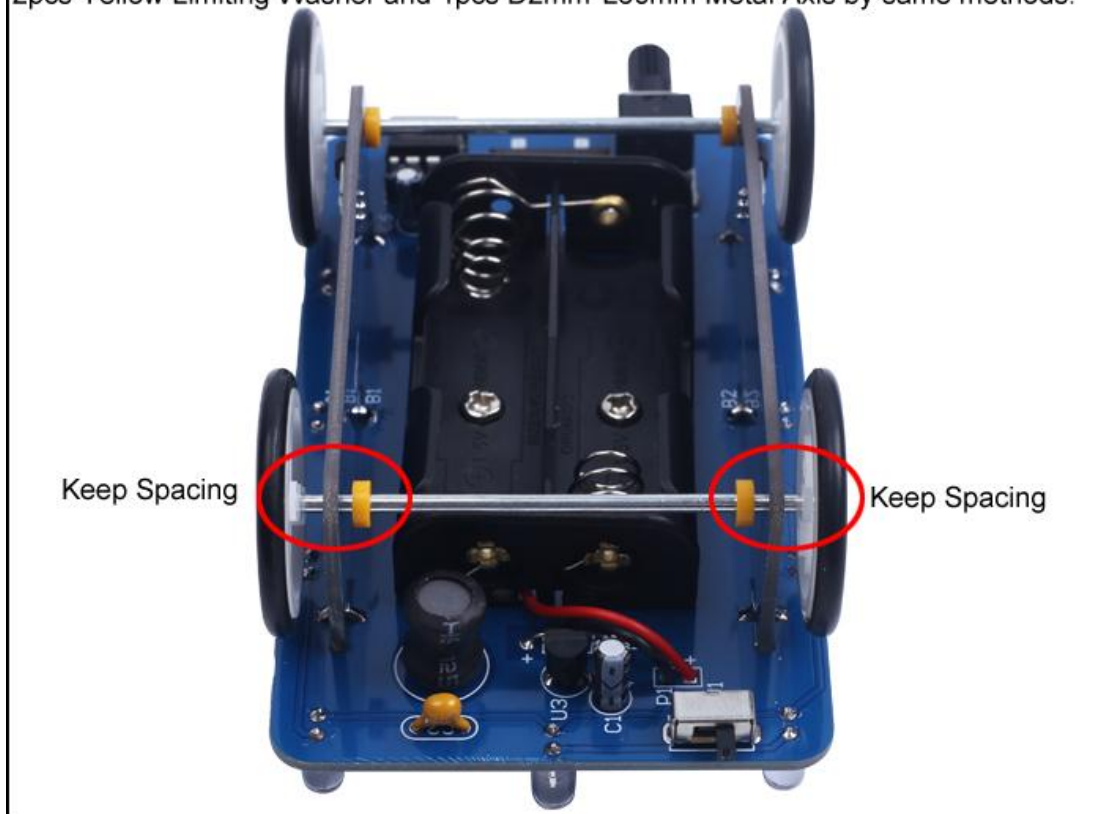
Step 31: Fine tune the position of Yellow Limiting Washer if the Metal Axis are not in the middle position or difficult to move.



Step 32: Fix another Rubber Ring Wheels **with** Round Magnet on the another end of D2mm\*L60mm Metal Axis. Note: Magnet and Axis in the same side.



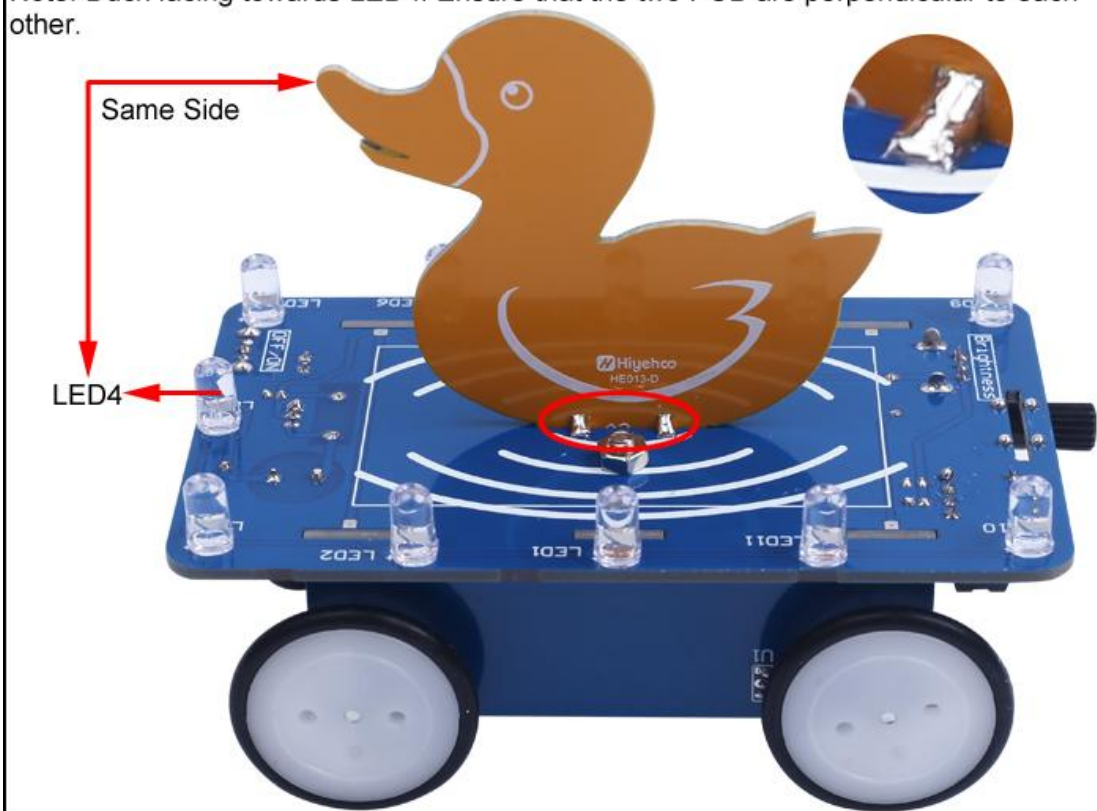
Step 33: Install and Fix another 2pcs Rubber Ring Wheels **without** Round Magnet, 2pcs Yellow Limiting Washer and 1pcs D2mm\*L60mm Metal Axis by same methods.



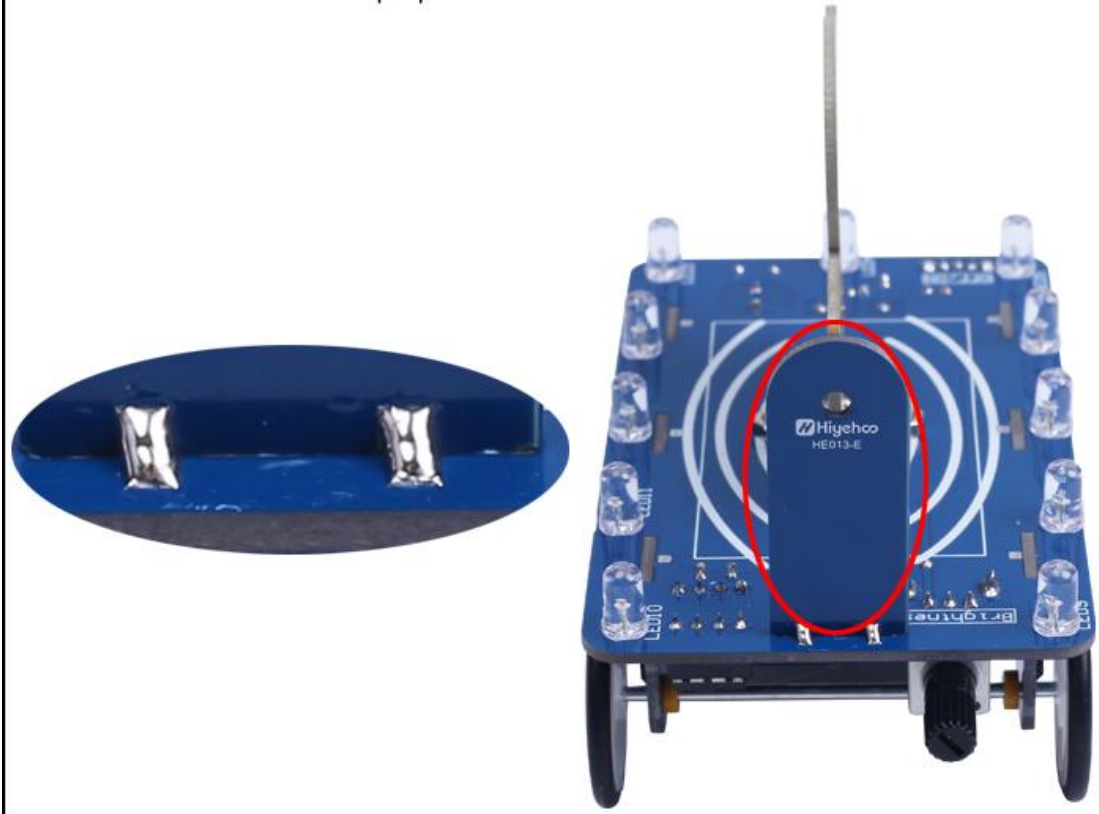
Step 34: Place tin at 8 pads as showing on PCB HE013-A.



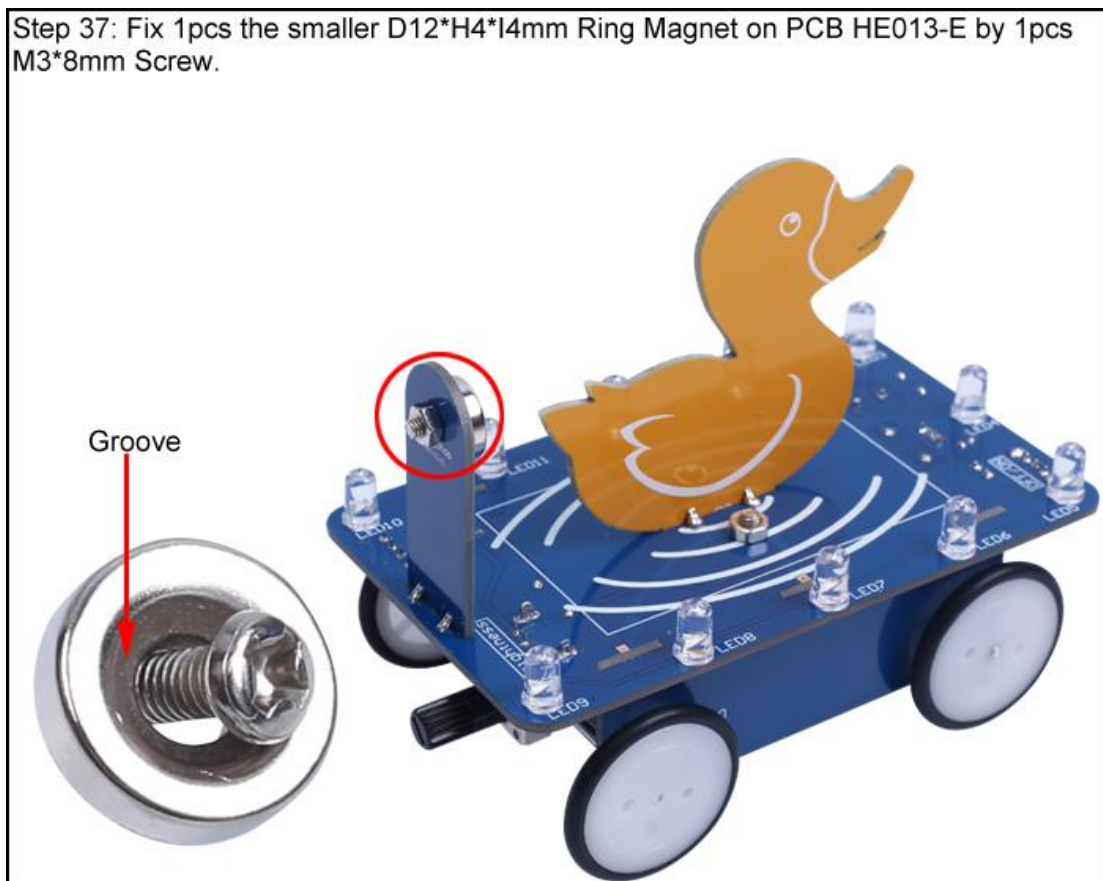
Step 35: Splicing and alignment PCB HE013-D and PCB HE013-A by pad and tin. Note: Duck facing towards LED4. Ensure that the two PCB are perpendicular to each other.



Step 36: Splicing and alignment PCB HE013-E and PCB HE013-A by pad and tin. Ensure that the two PCB are perpendicular to each other.



Step 37: Fix 1pcs the smaller D12\*H4\*I4mm Ring Magnet on PCB HE013-E by 1pcs M3\*8mm Screw.



Step 38: Fix 2pcs the bigger D15\*H4\*14mm Ring Magnet on PCB HE013-F by 1pcs M3\*8mm Screw.

