

# **Manual for ViVi Debug**



**Manual for ViVi Debug**11, 12, 2017Num : DBH011CN**Updation**

date	ver	context
2017-12-11	V1.0	First.

**wiki: [wiki.doit.am](http://wiki.doit.am)****Online shop: aliexpress, amazon, [www.vvdoit.com](http://www.vvdoit.com)**

## 目录

目录 .....	3
1 物料清单 .....	4
2 主控板介绍 .....	5
3 结构介绍 .....	7
散装结构图 .....	错误! 未定义书签。
正面结构图 .....	错误! 未定义书签。
背面结构图 .....	错误! 未定义书签。
实物尺寸图 .....	错误! 未定义书签。
4 组装与调试 .....	11
1)物料准备 .....	11
a. 舵机处理 .....	11
b. 头部处理 .....	13
c. 手掌处理 .....	16
d. APP 安装 .....	18
2)安装舵机 .....	19
a. 中框 .....	19
b. 双腿 .....	23
c. 双臂 .....	28
3)关节组装 .....	32
a. 主控板上电 .....	32
b. 躯干上电 .....	34
c. 双腿关节上电 .....	38
d. 胳膊关节上电 .....	49
e. 脚板和手臂安装 .....	53
f. 头部安装 .....	57
g. APP 调试 .....	62
h. 锁上螺丝 .....	112
i. 装上后背 .....	115
附录. 设计资料 .....	错误! 未定义书签。

## 1 Material List

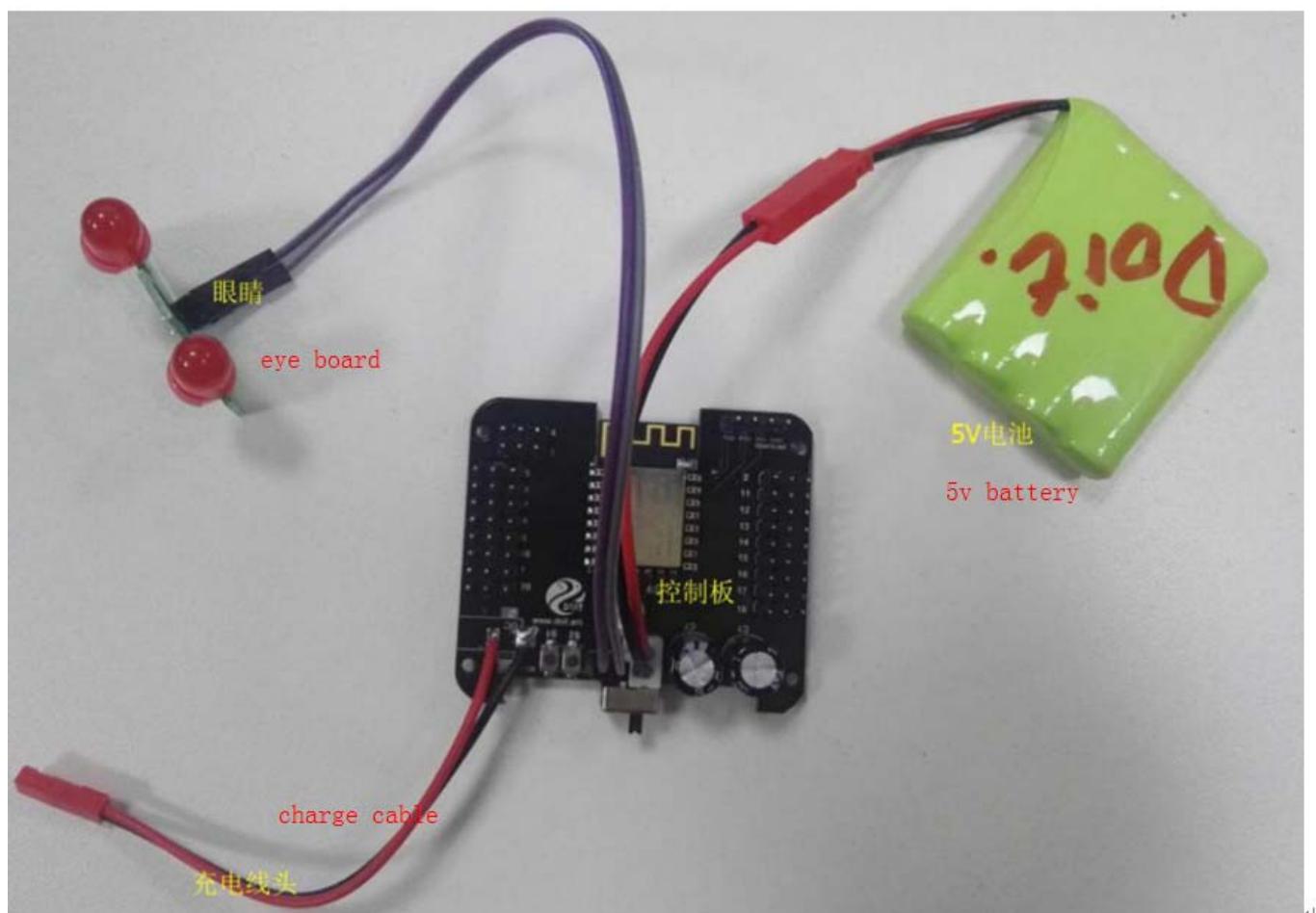


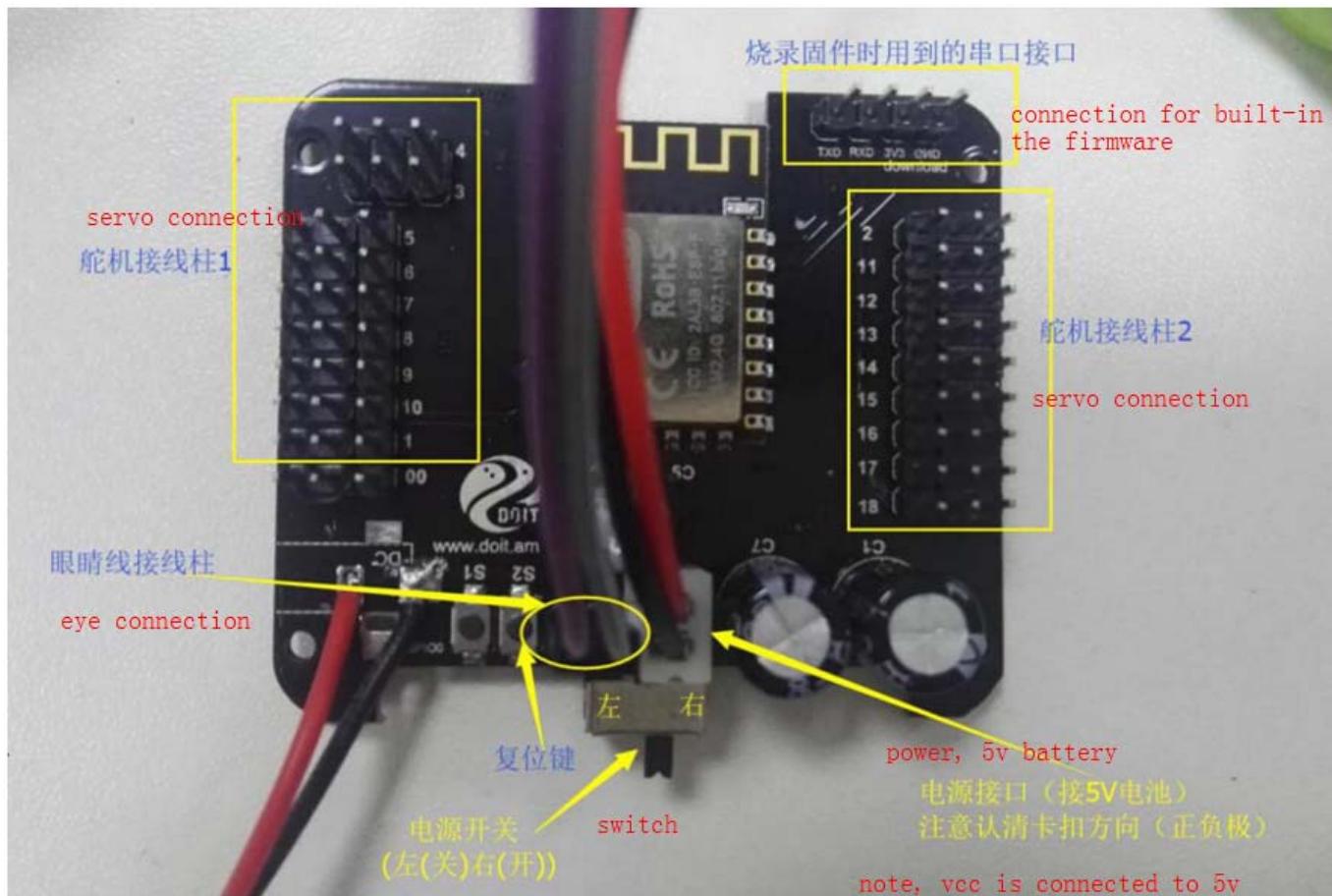
Note: the part name may be varied during the installation

Num	Name	Quan	Num	Name	Quan	Num	Name	Quan
1	head	1	11	Left Shank	1	21	Long M2.5 Self Tapping Screws	4
2	chin	1	12	right Shank	1	22	M2.5 Self Tapping Screws	1
3	Left shoulder (waist)	2	13	Left knee	1	23	M2.5 screw	1
4	right shoulder (waist)	2	14	right knee	1	24	M2.5 nut	1
5	Left (right) arm	2	15	Left Paw palm	1	25	M2.5 gasket	1
6	Left (right) hand	2	16	right Paw palm	1	26	Servo	18
7	Left (right) palm	2	17	Back	1	27	5V battery	1

8	Box	1	18	chest	1	28	Eye board	1
9	Right servo bracket	2	19	neck	1	29	Control board	1
10	Left servo bracket	2	20	Servo disc	6	30	charger	1

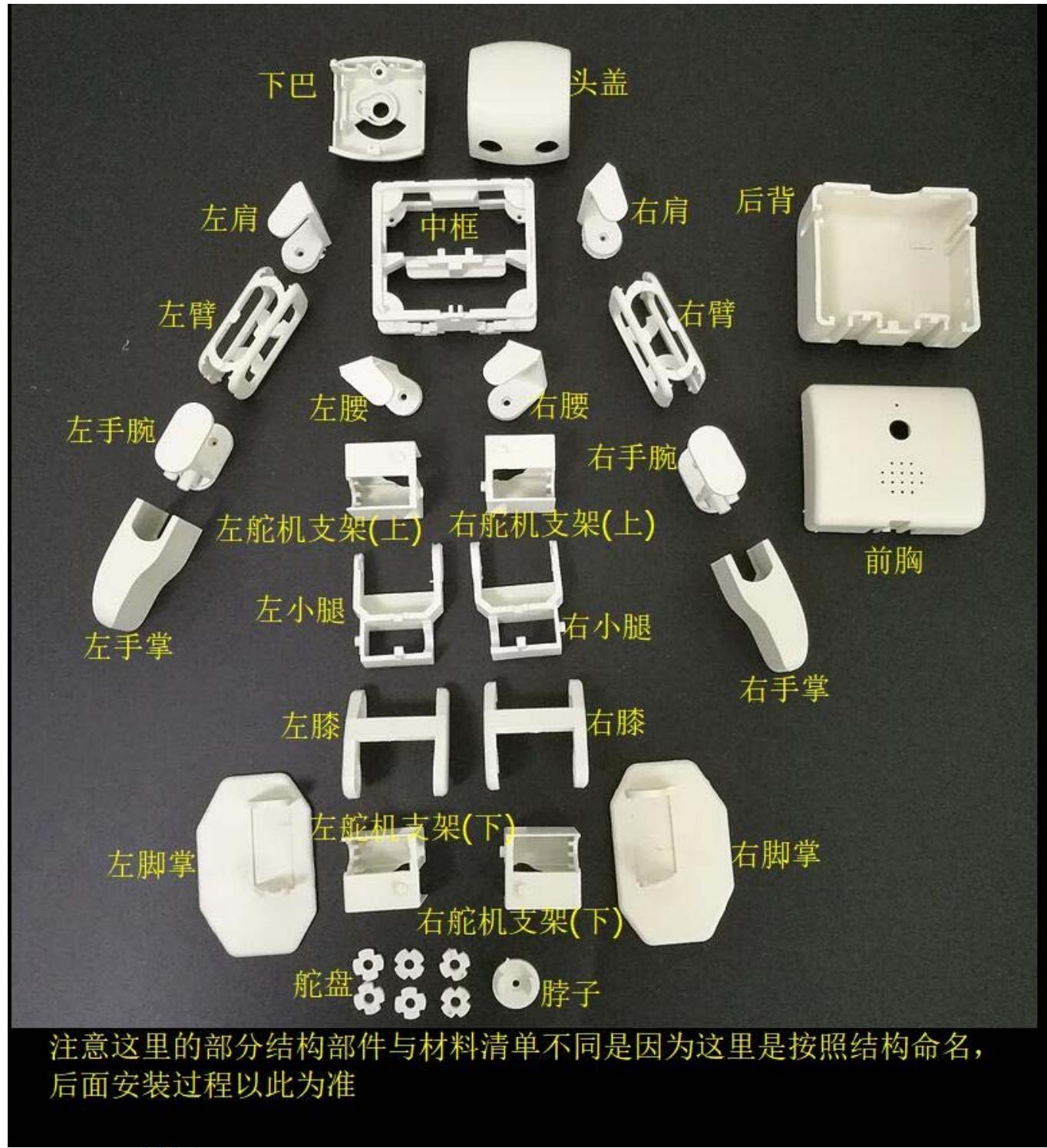
## 2 Control board





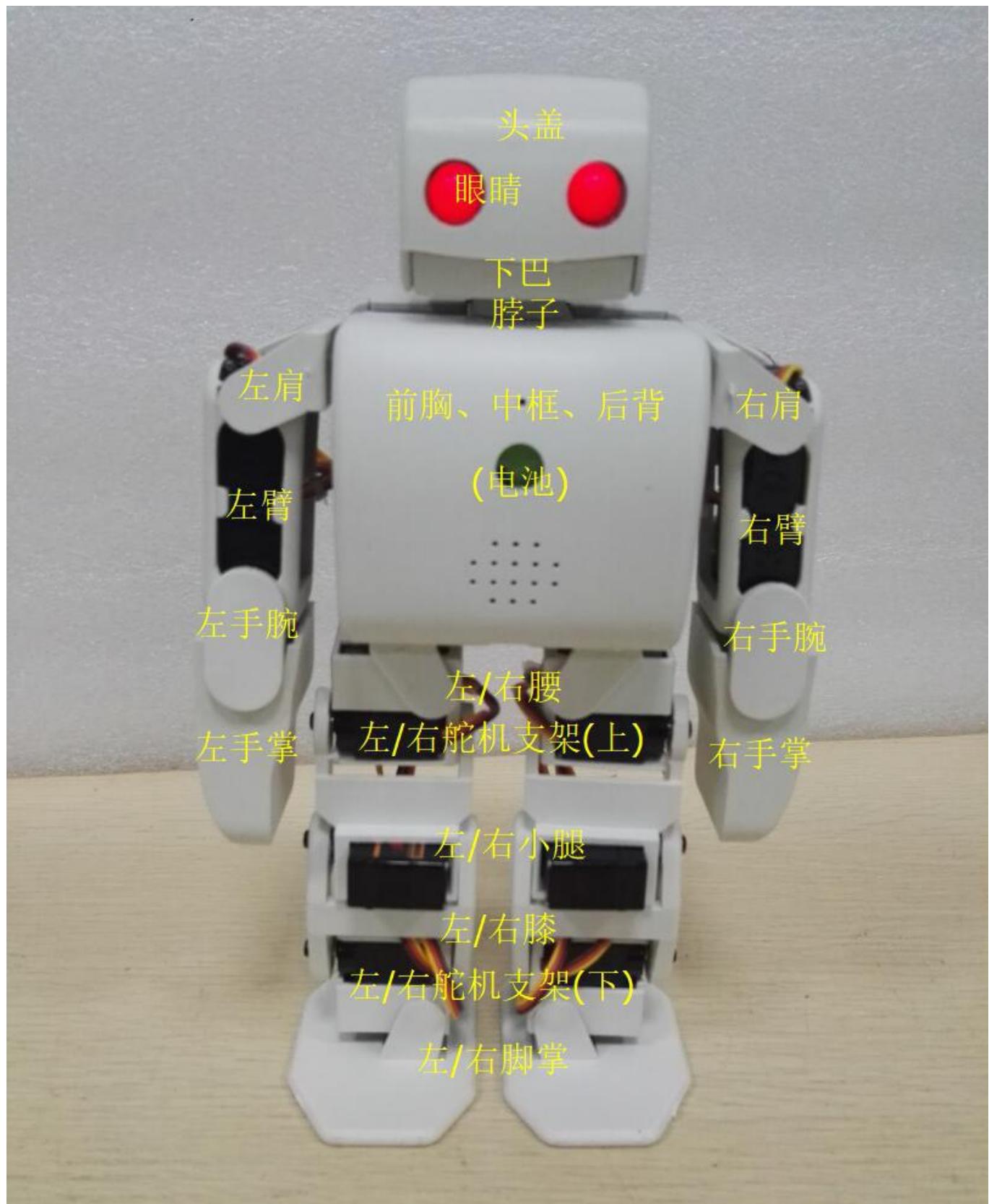
### 3 Structure

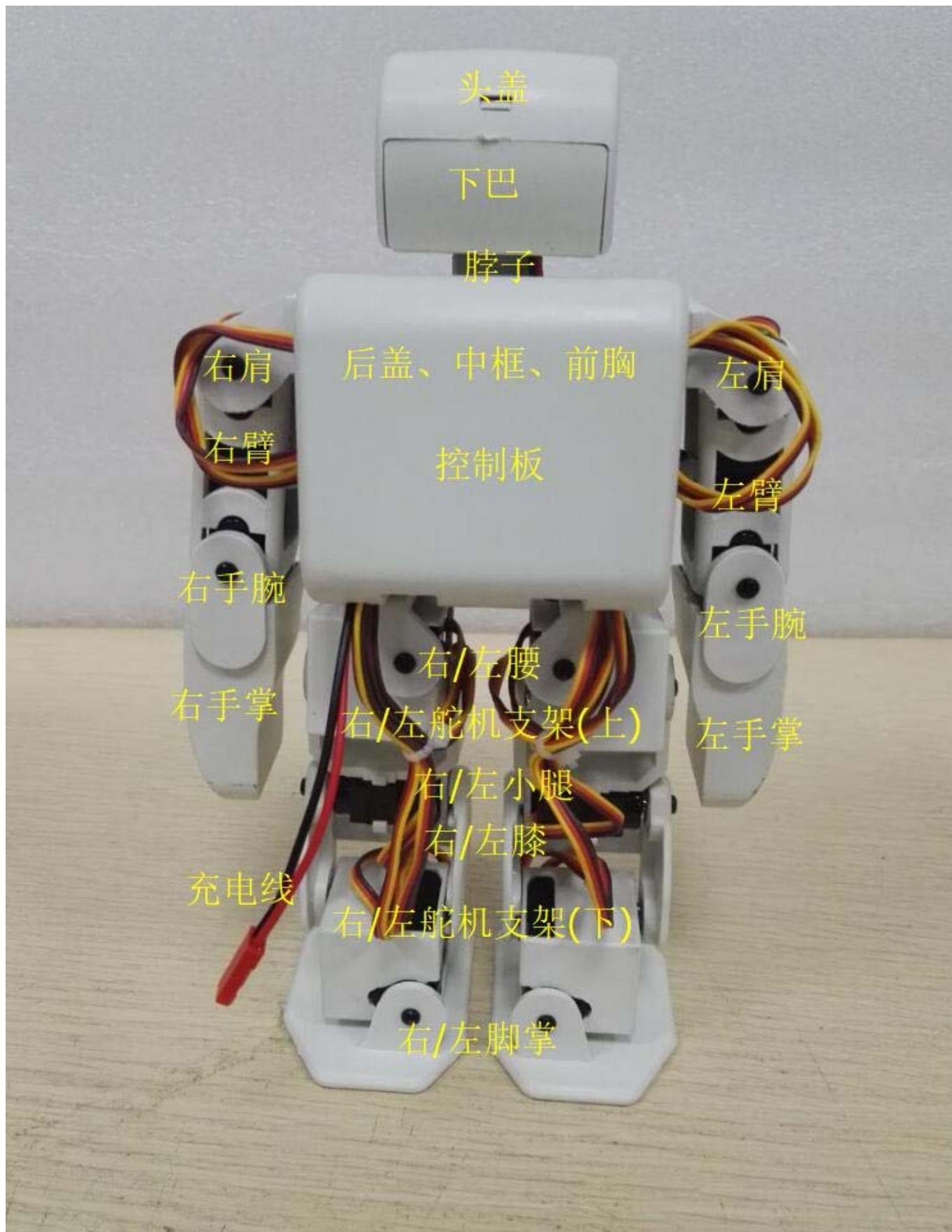
picture of unassembled, please compared with the first picture.

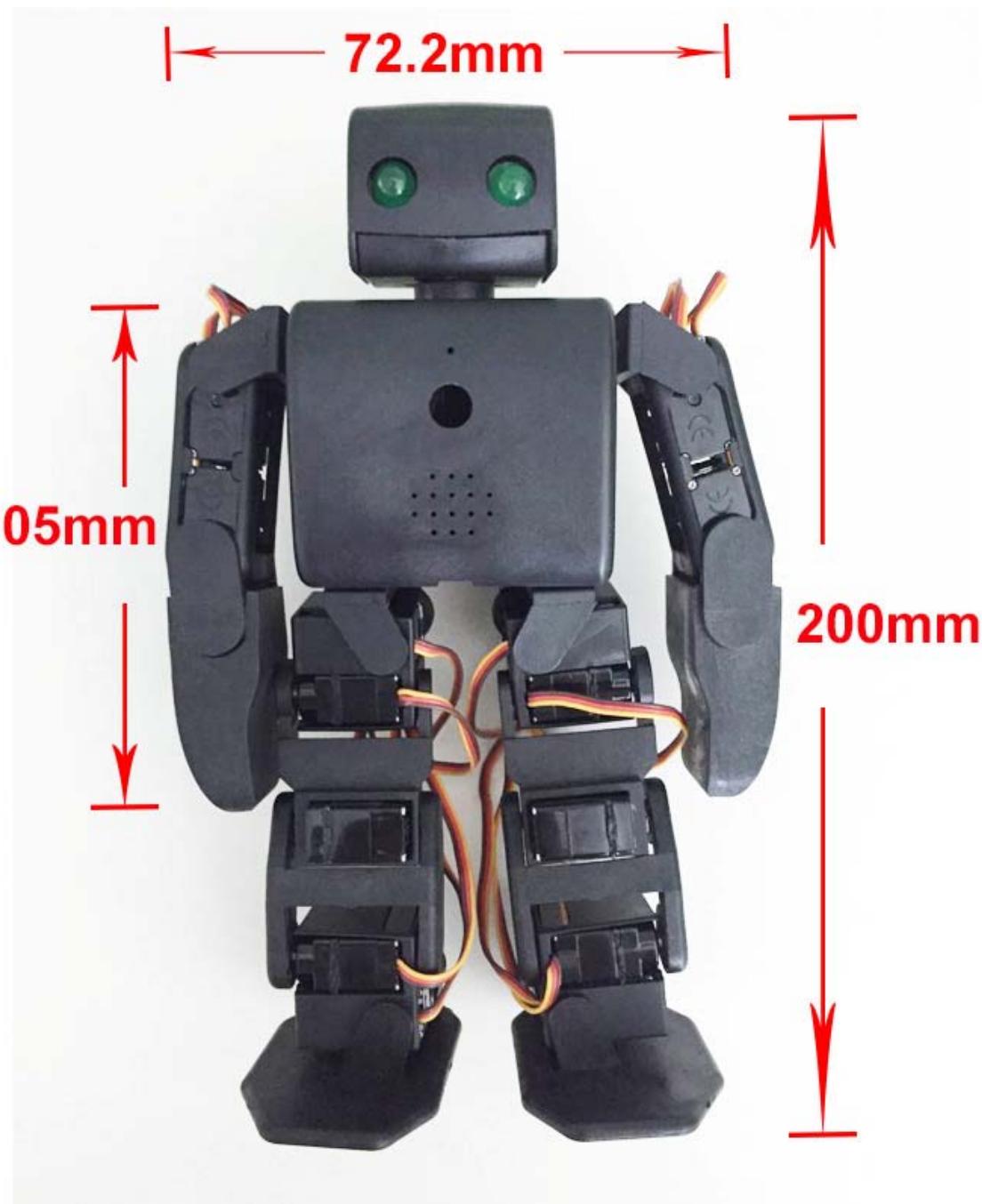


注意这里的部分结构部件与材料清单不同是因为这里是按照结构命名，后面安装过程以此为准



**after installation**

**back view**

**size**

Doctors of Internet

## 4 install and debug

### 1) material

#### a. servo



004

如图, 对每个舵机进行处理

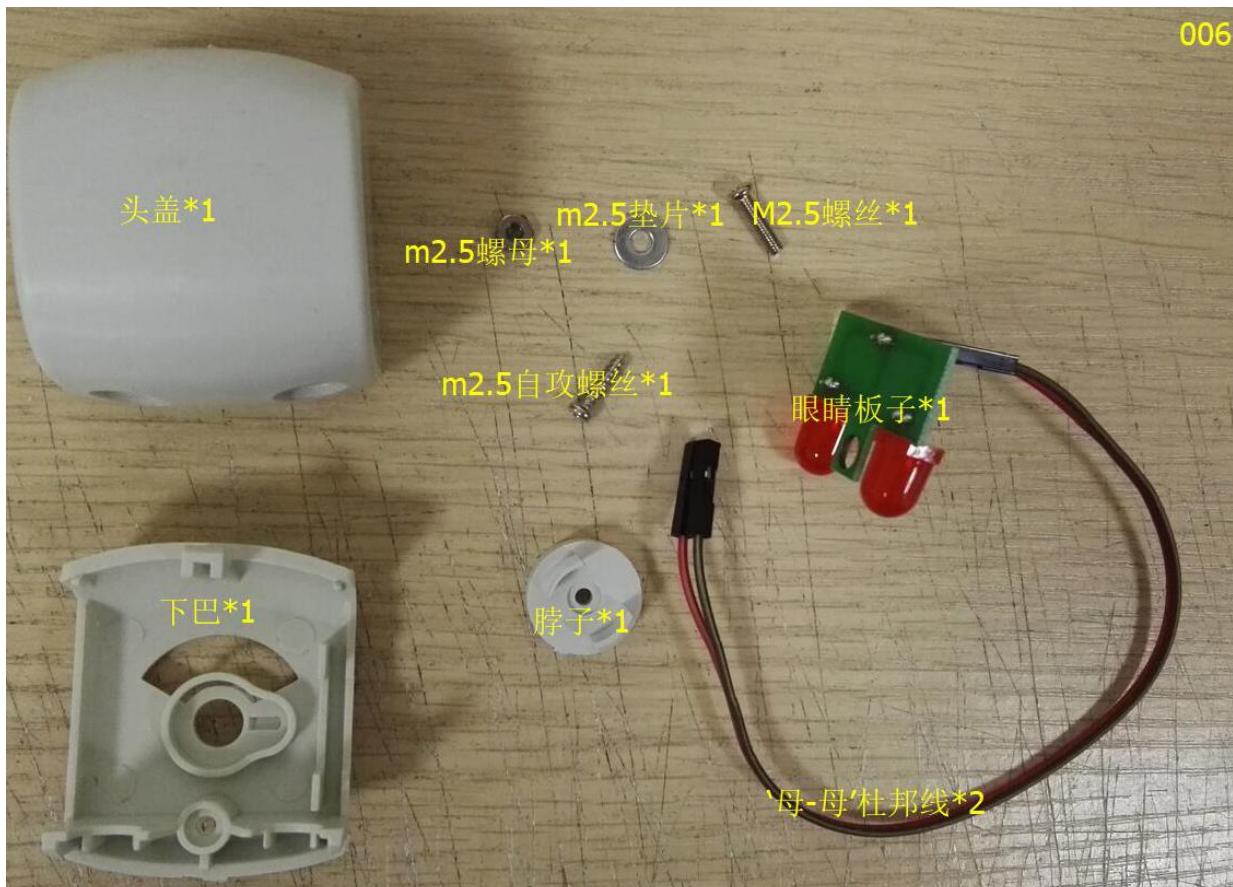


005

after handling  
处理后的舵机\*18 (个)

黑色舵机螺丝\*32

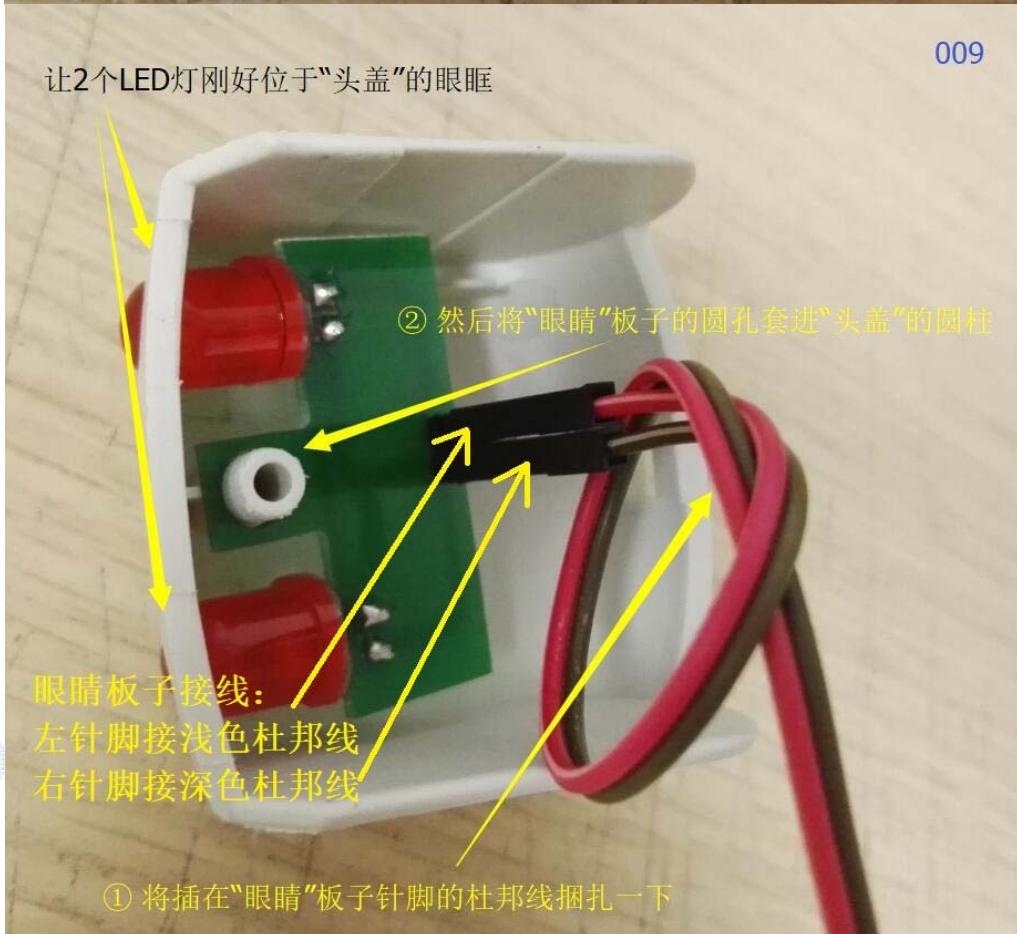


**b. head**

008



009





010



011

"m2.5自攻螺丝"

012

用“m2.5自攻螺丝”从这个圆孔锁住“头盖”



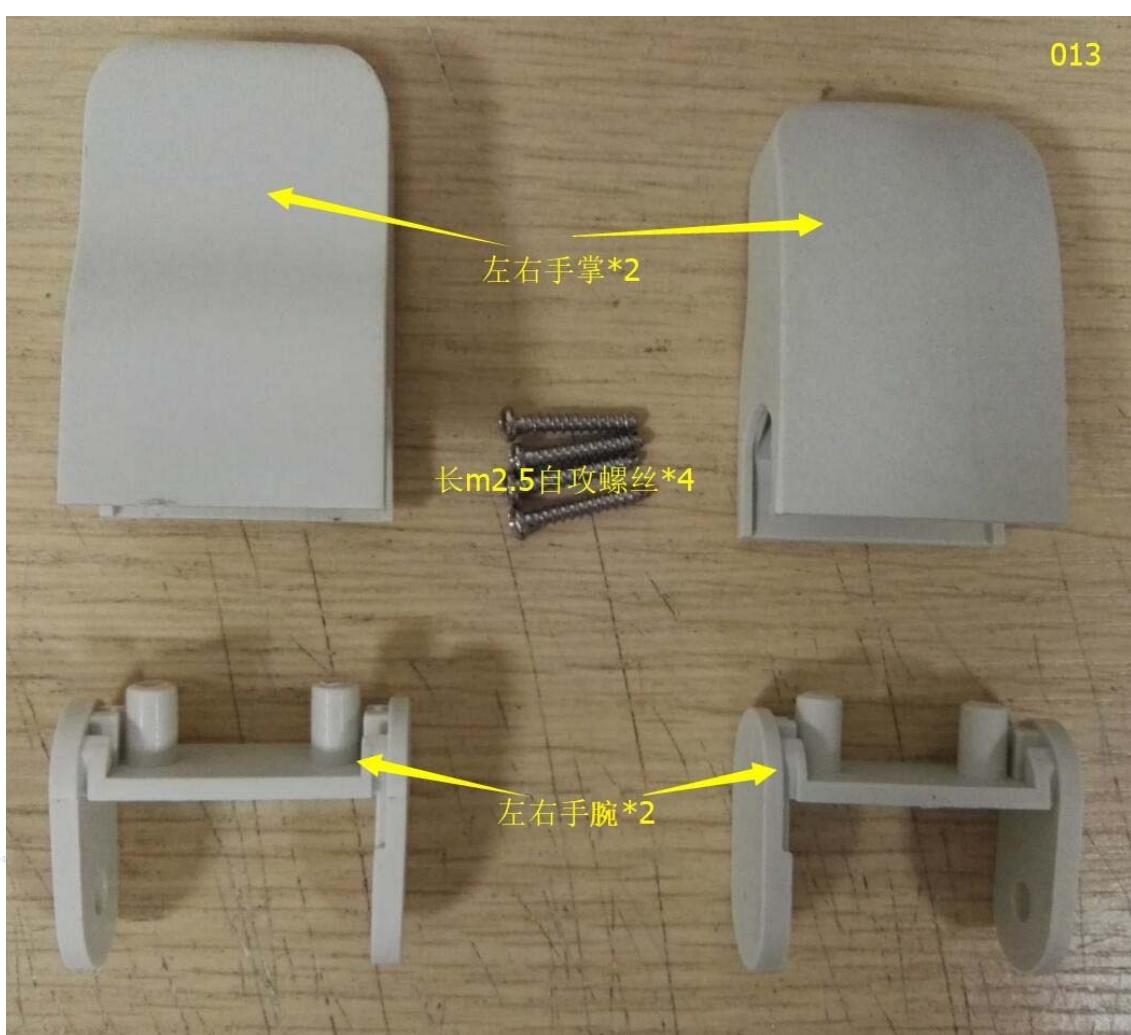
### c. palm

013

左右手掌\*2

长m2.5自攻螺丝\*4

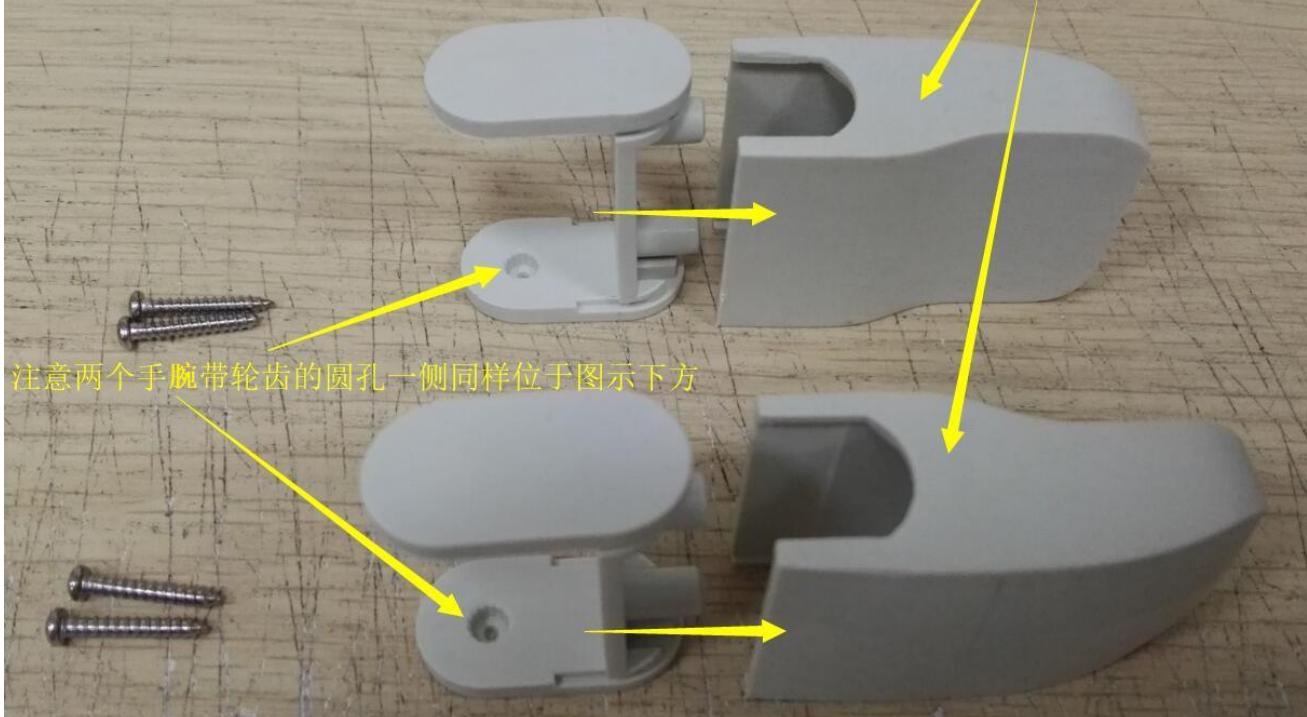
左右手腕\*2



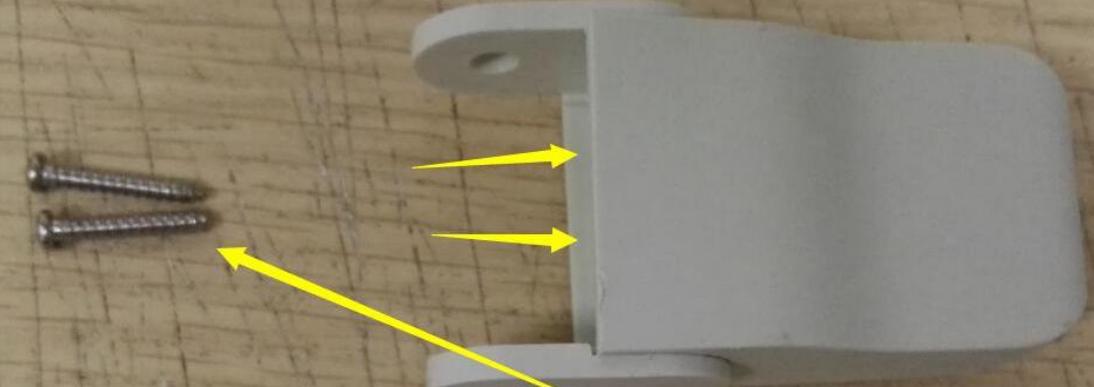
如图, 将左右手掌和手腕的卡扣进行安装

两个手掌放置成对称方向

014



015



左右手腕和手掌卡紧之后, 每个用2个“长m2.5自攻螺丝”穿过圆柱拧紧



016

左右手掌和手腕分别用2个螺丝固定好



#### d. APP installation

android

link 1: [http://www.doit.am/ViVi\\_1.1.0.apk](http://www.doit.am/ViVi_1.1.0.apk)

link 2: <https://www.pgyer.com/qIYq>

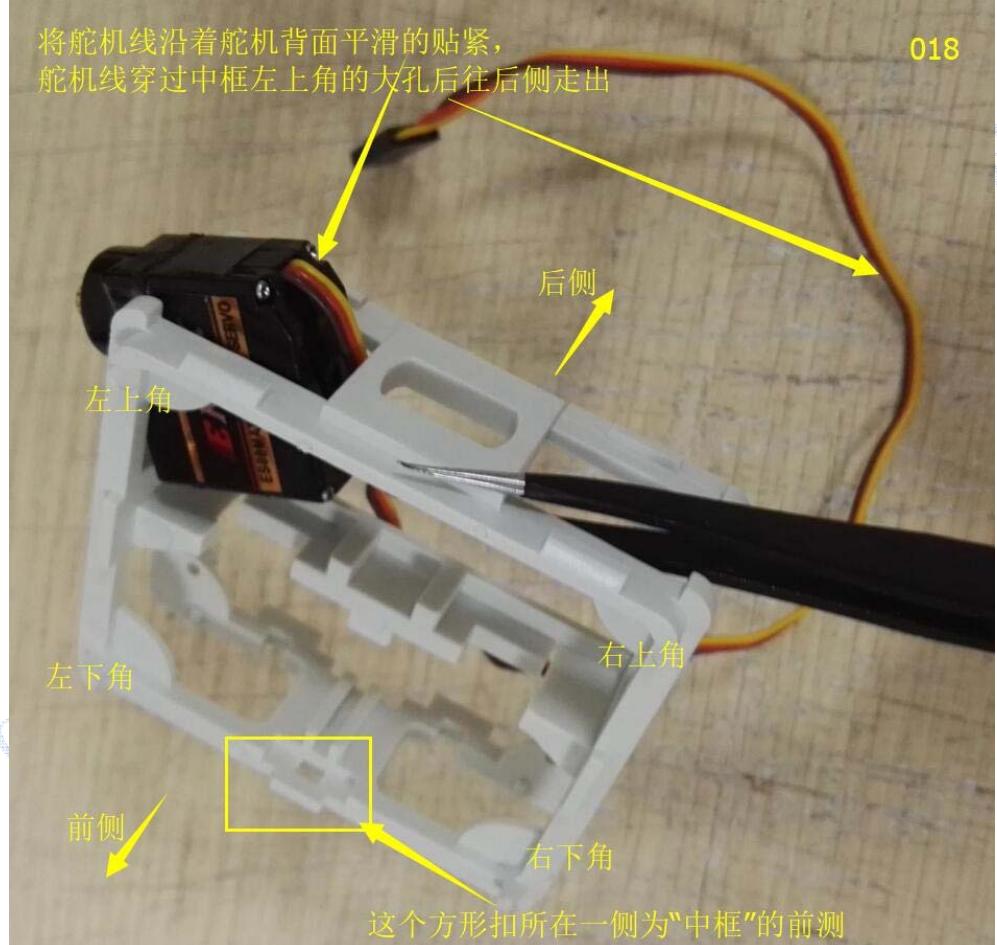
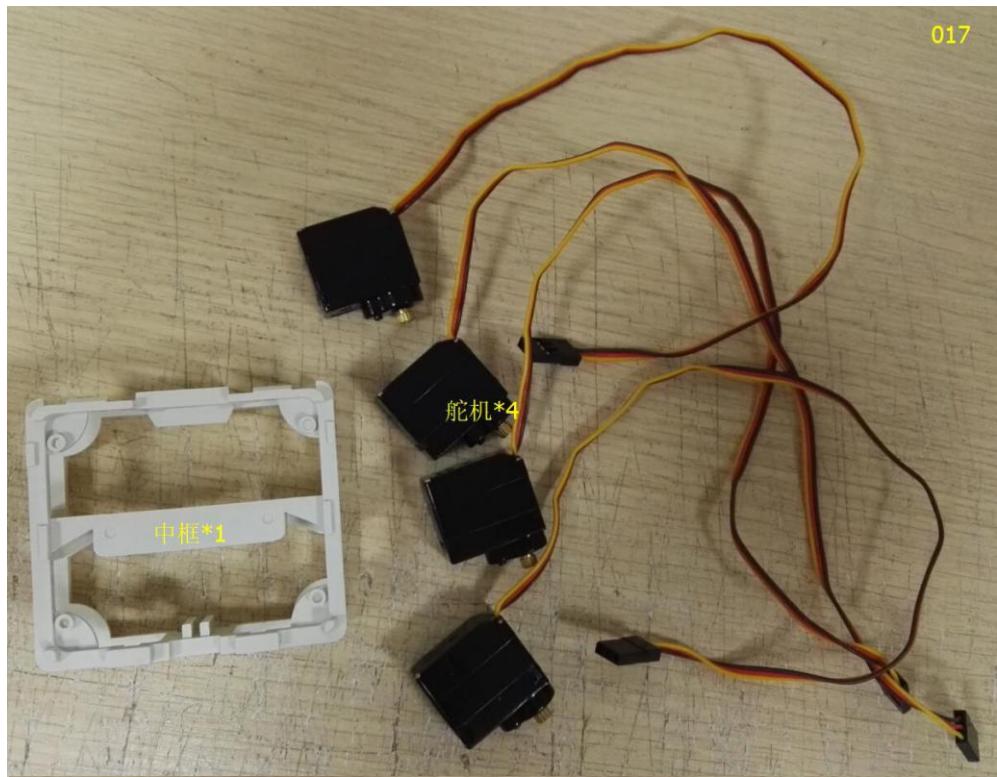
iOS:

link: <https://itunes.apple.com/us/app/vivi-robot/id1255421040?l=zh&ls=1&mt=81>. Install  
or search “ViViRobot” at APP store.



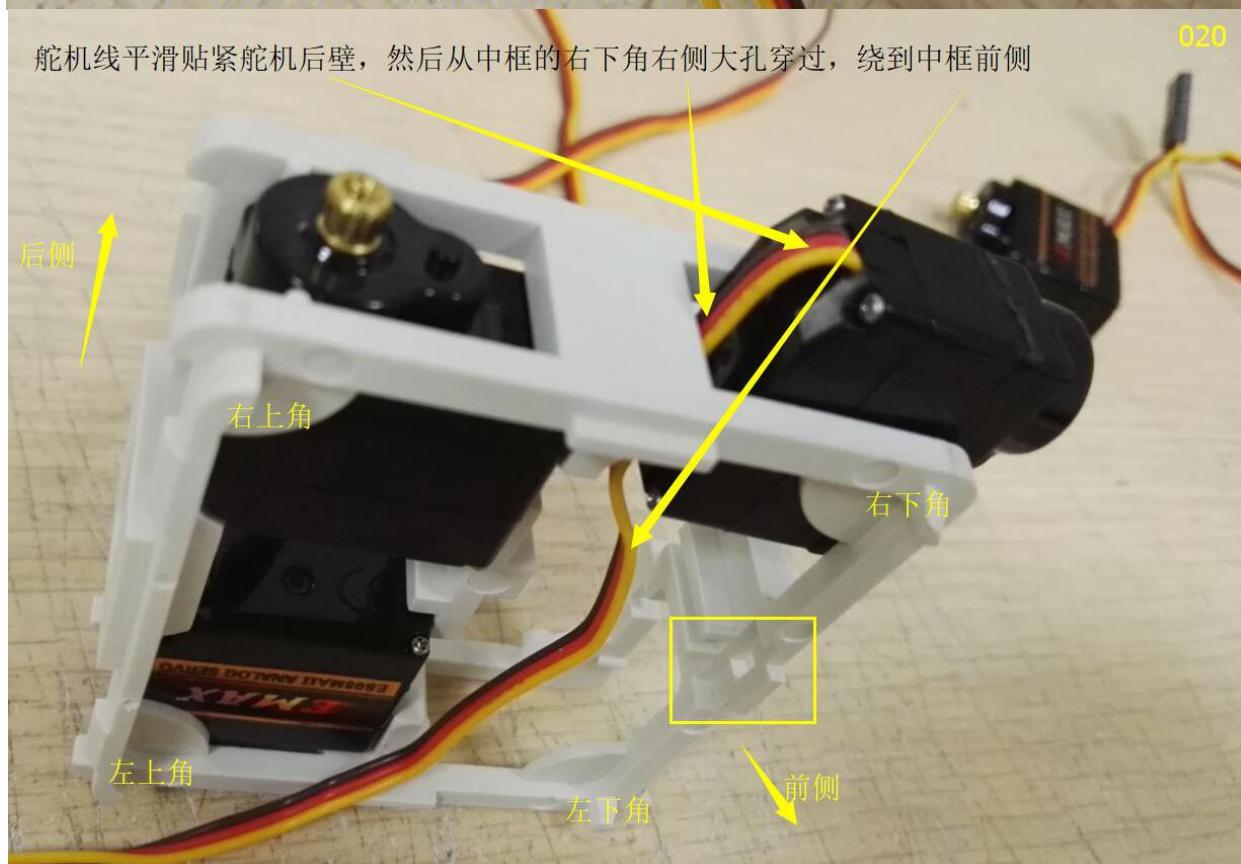
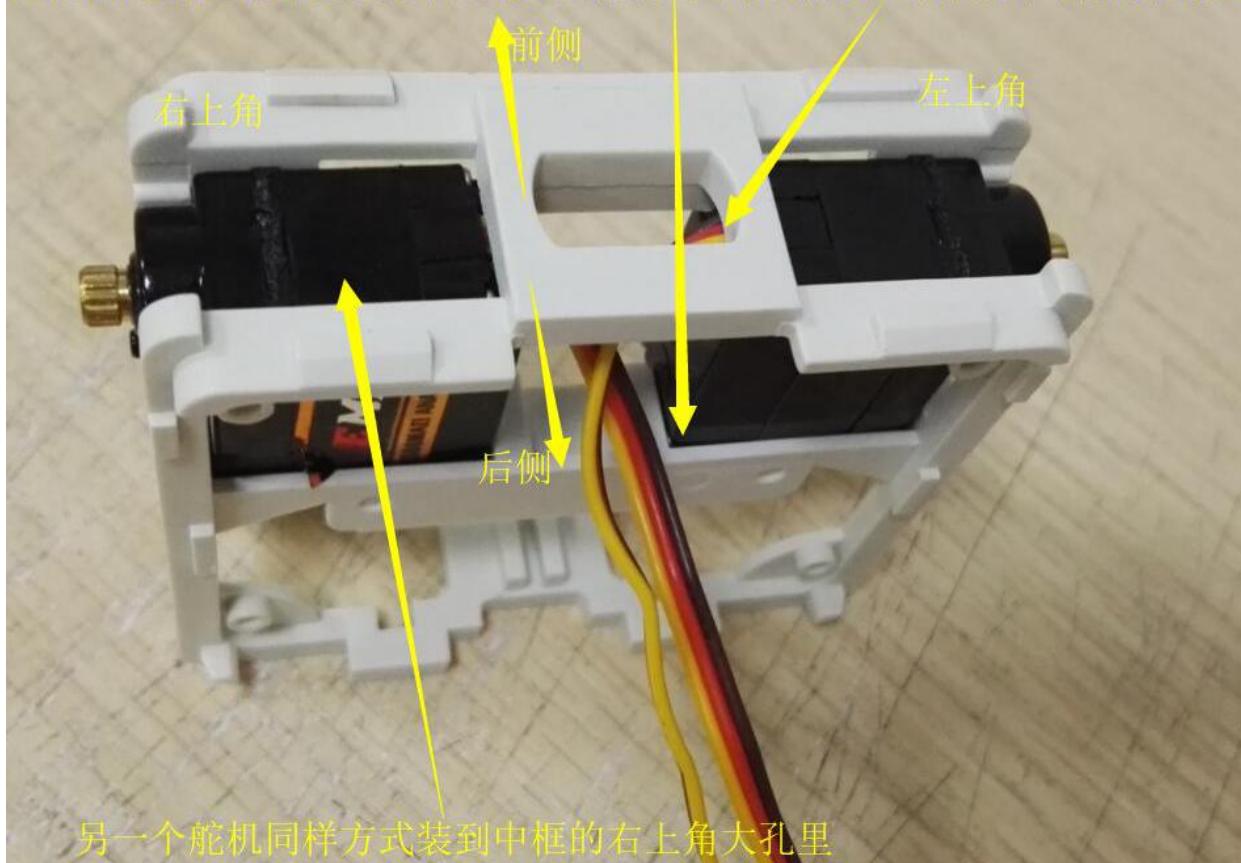
## 2)install servo

### a. box



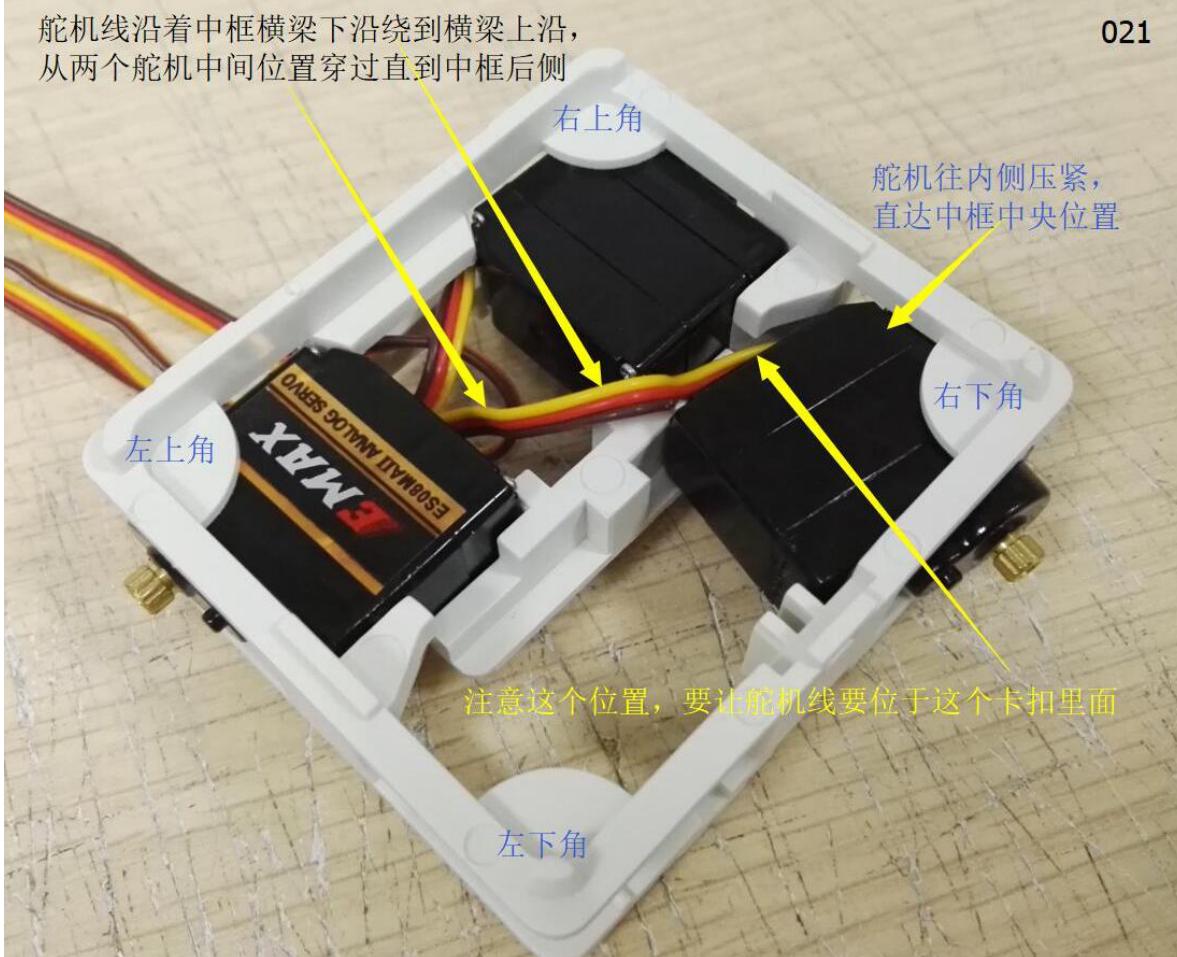
019

然后舵机往下压进去，直到抵达中框的横梁，  
过程中避免让舵机线接头不要夹在舵机与中框顶梁中间导致导线磨损破皮

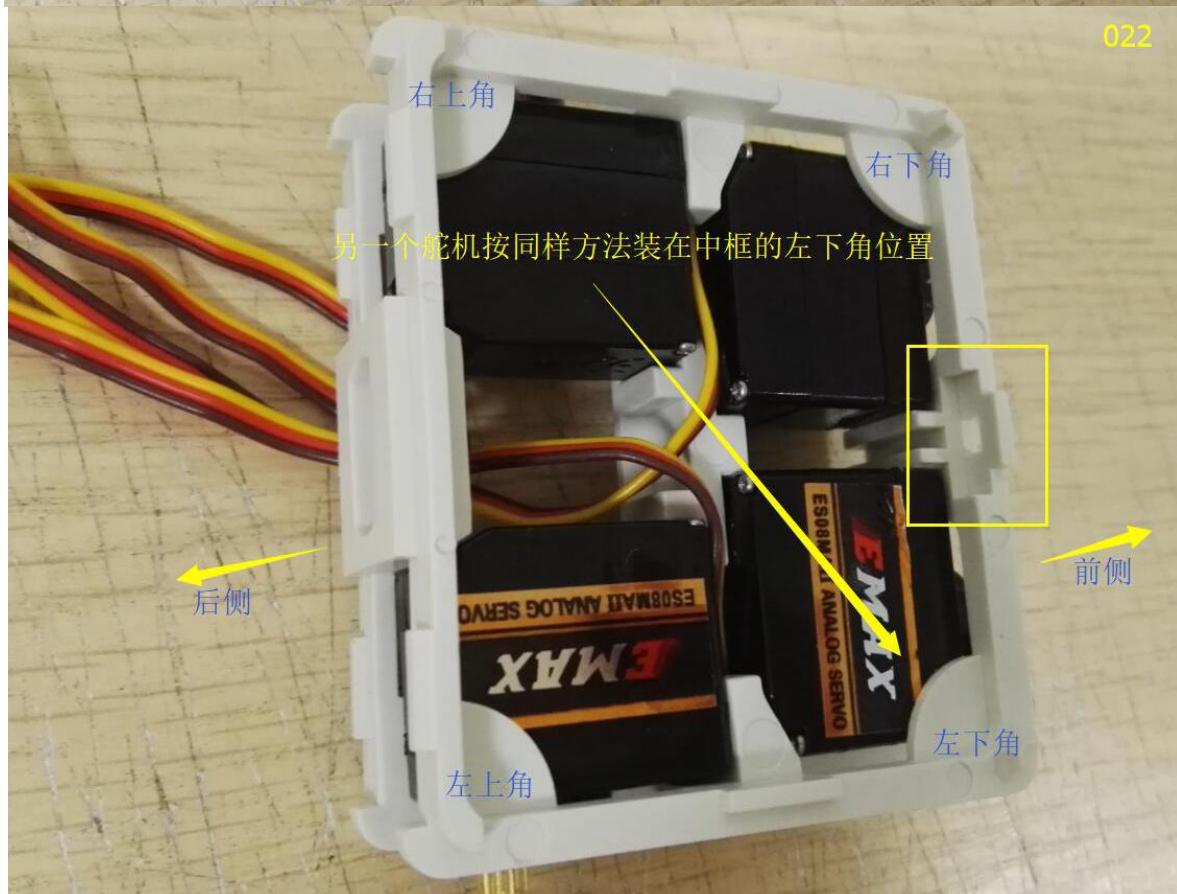


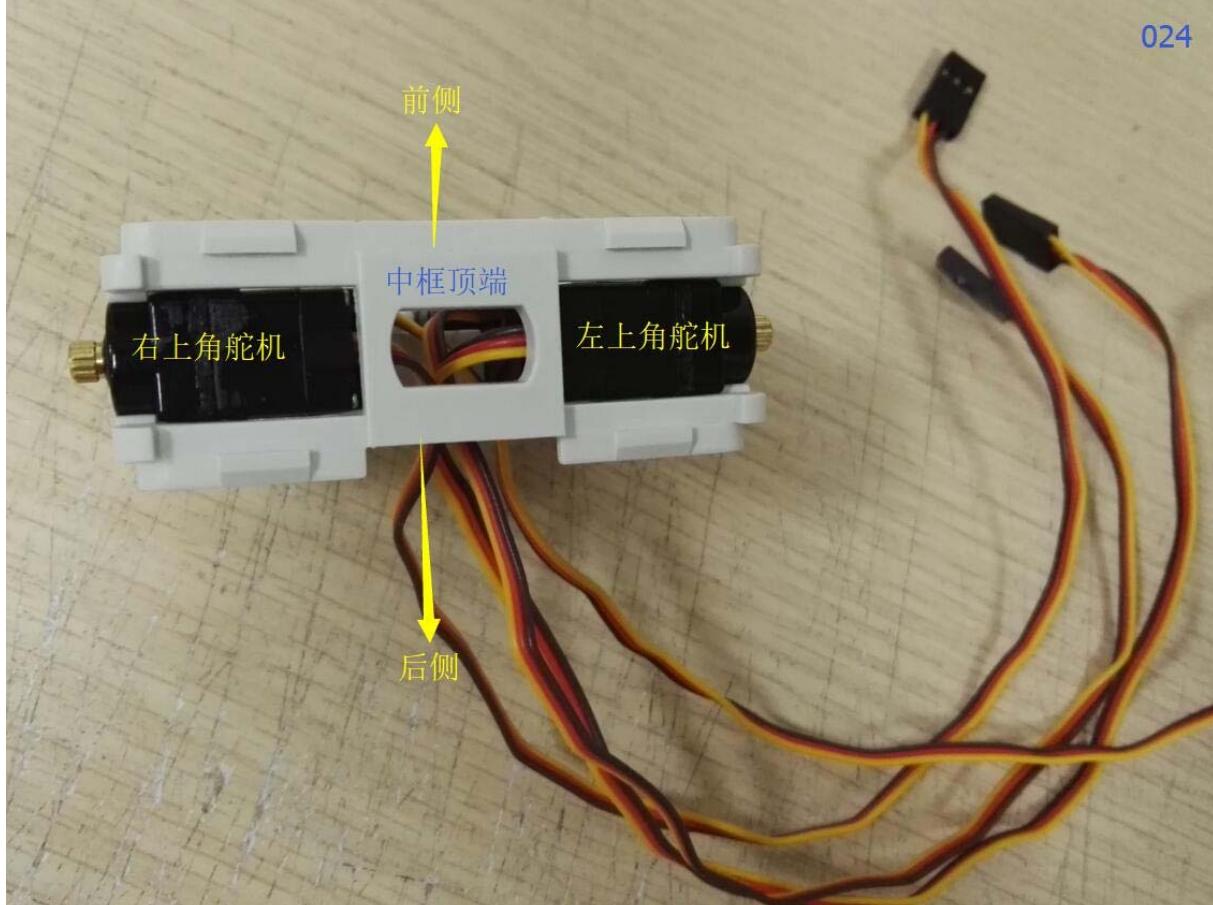
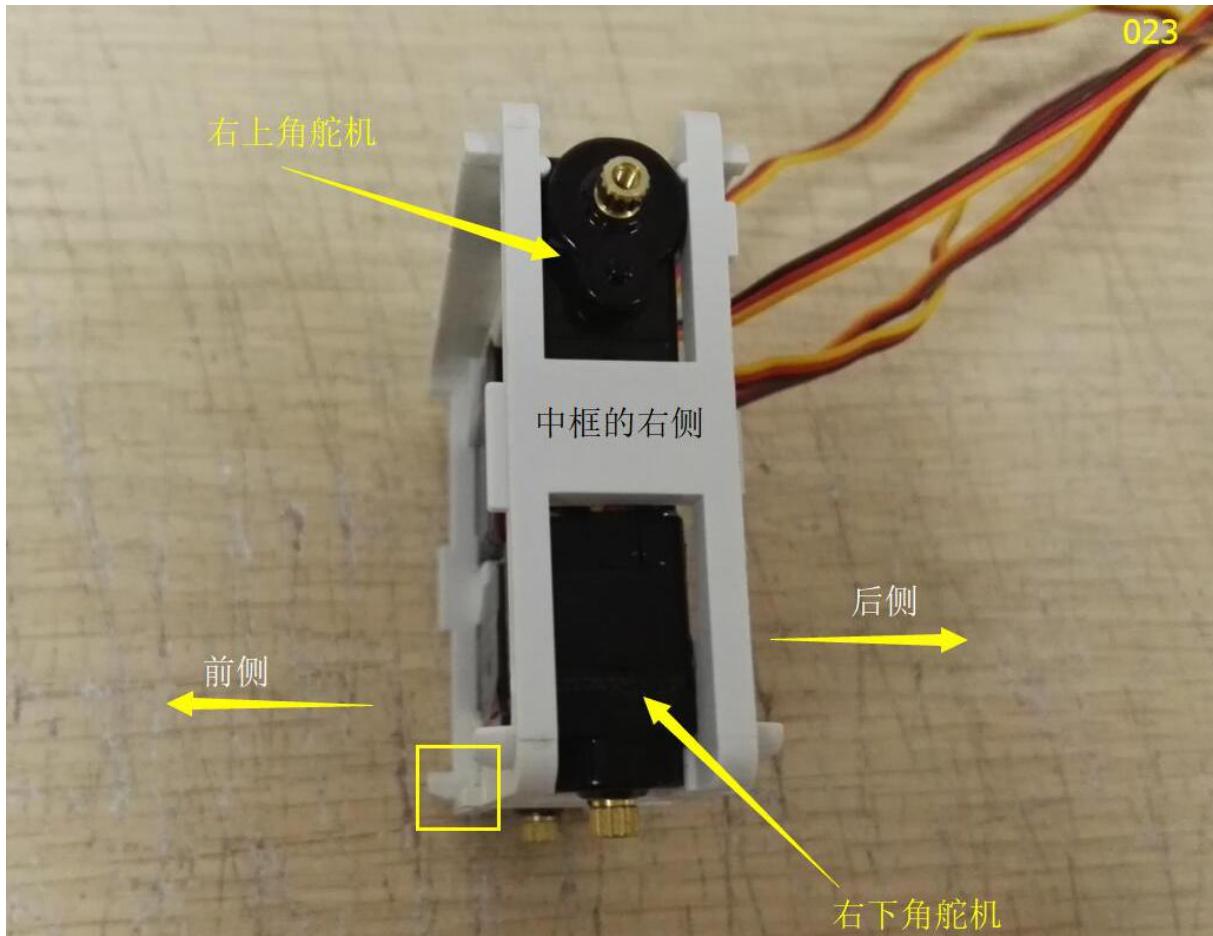
舵机线沿着中框横梁下沿绕到横梁上沿，  
从两个舵机中间位置穿过直到中框后侧

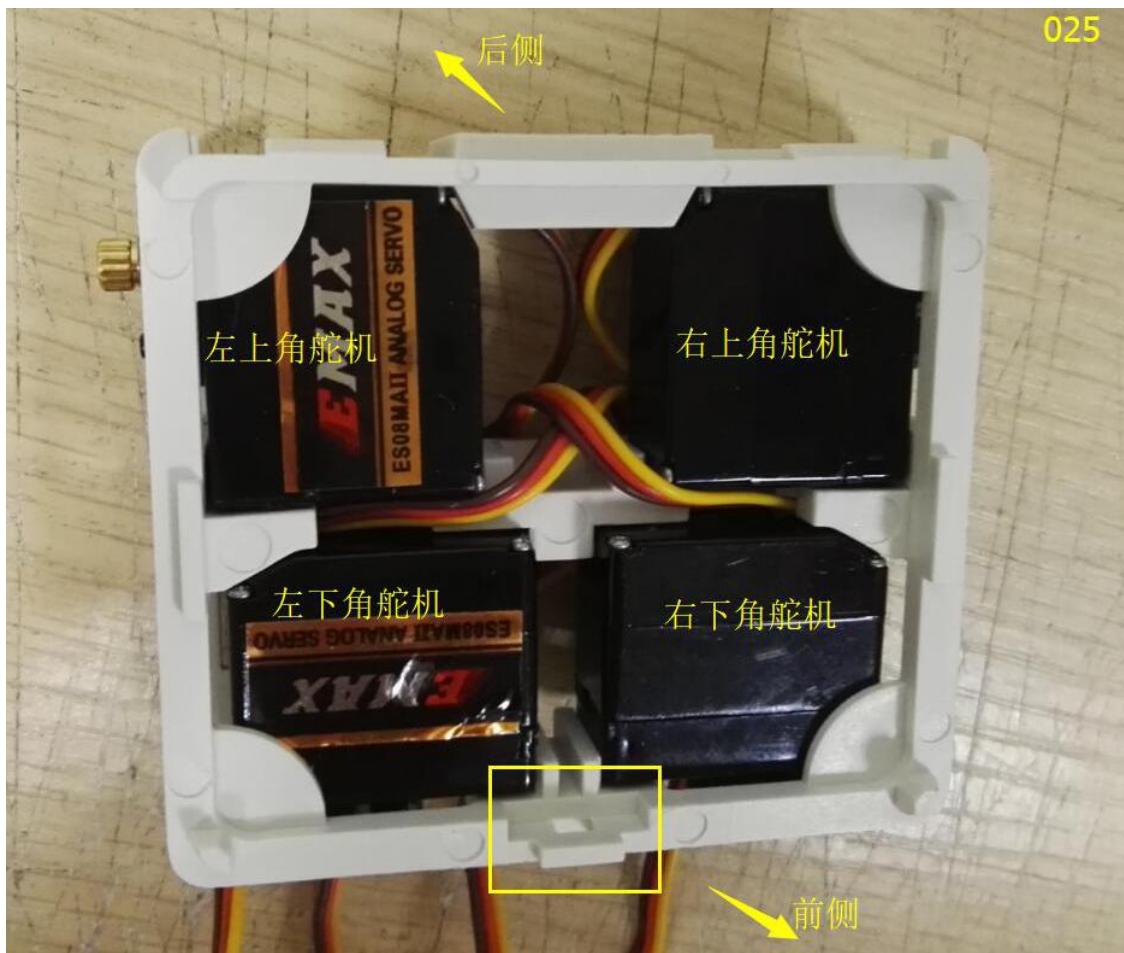
021



022







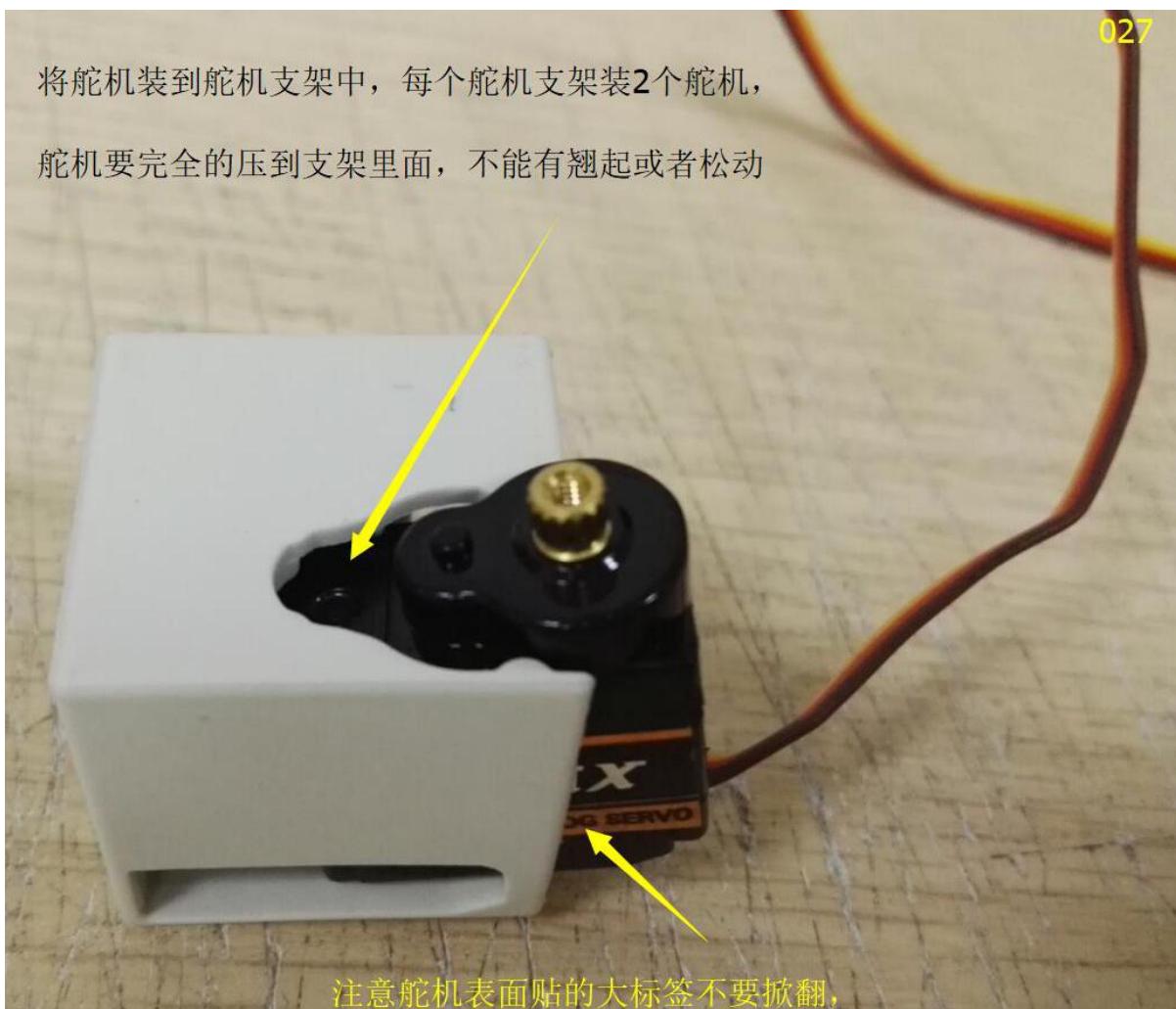
b. legs



027

将舵机装到舵机支架中，每个舵机支架装2个舵机，

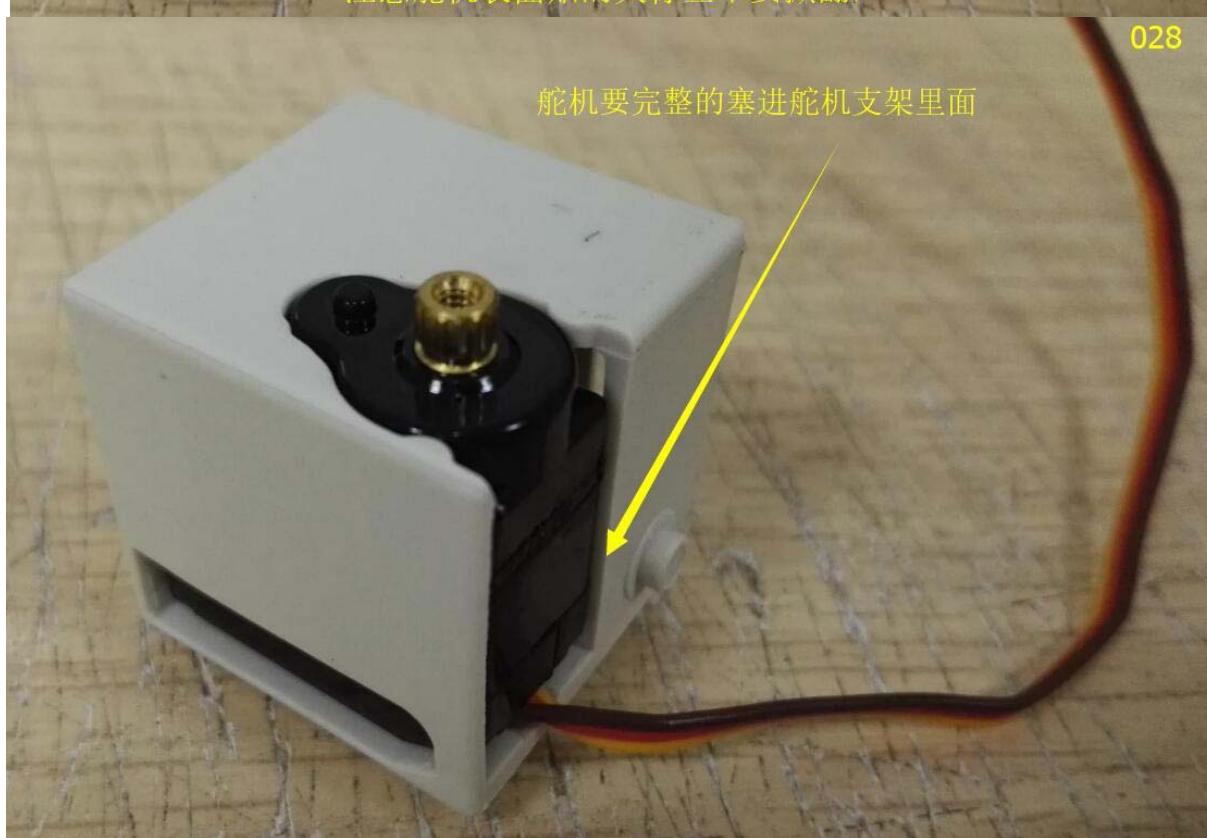
舵机要完全的压到支架里面，不能有翘起或者松动



注意舵机表面贴的大标签不要掀翻，

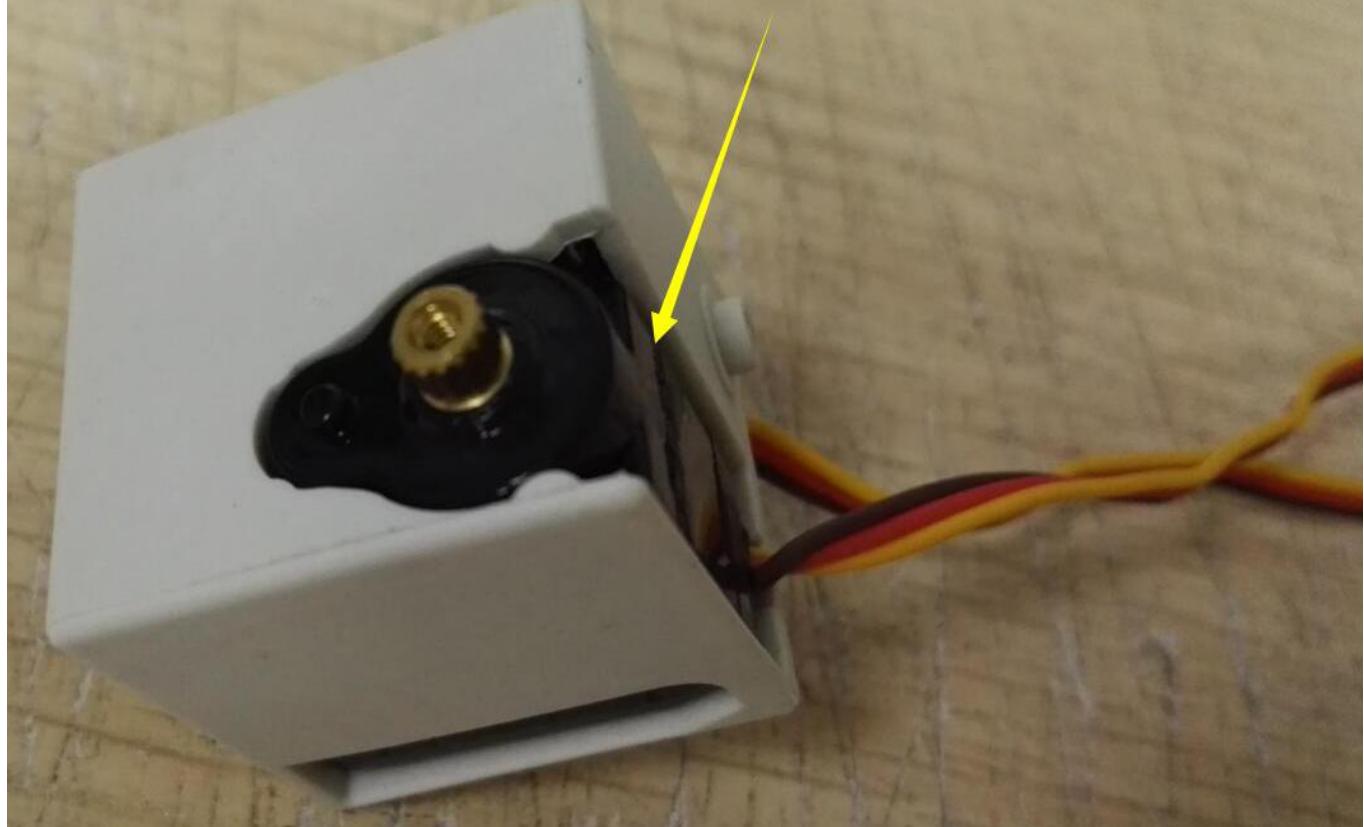
028

舵机要完整的塞进舵机支架里面



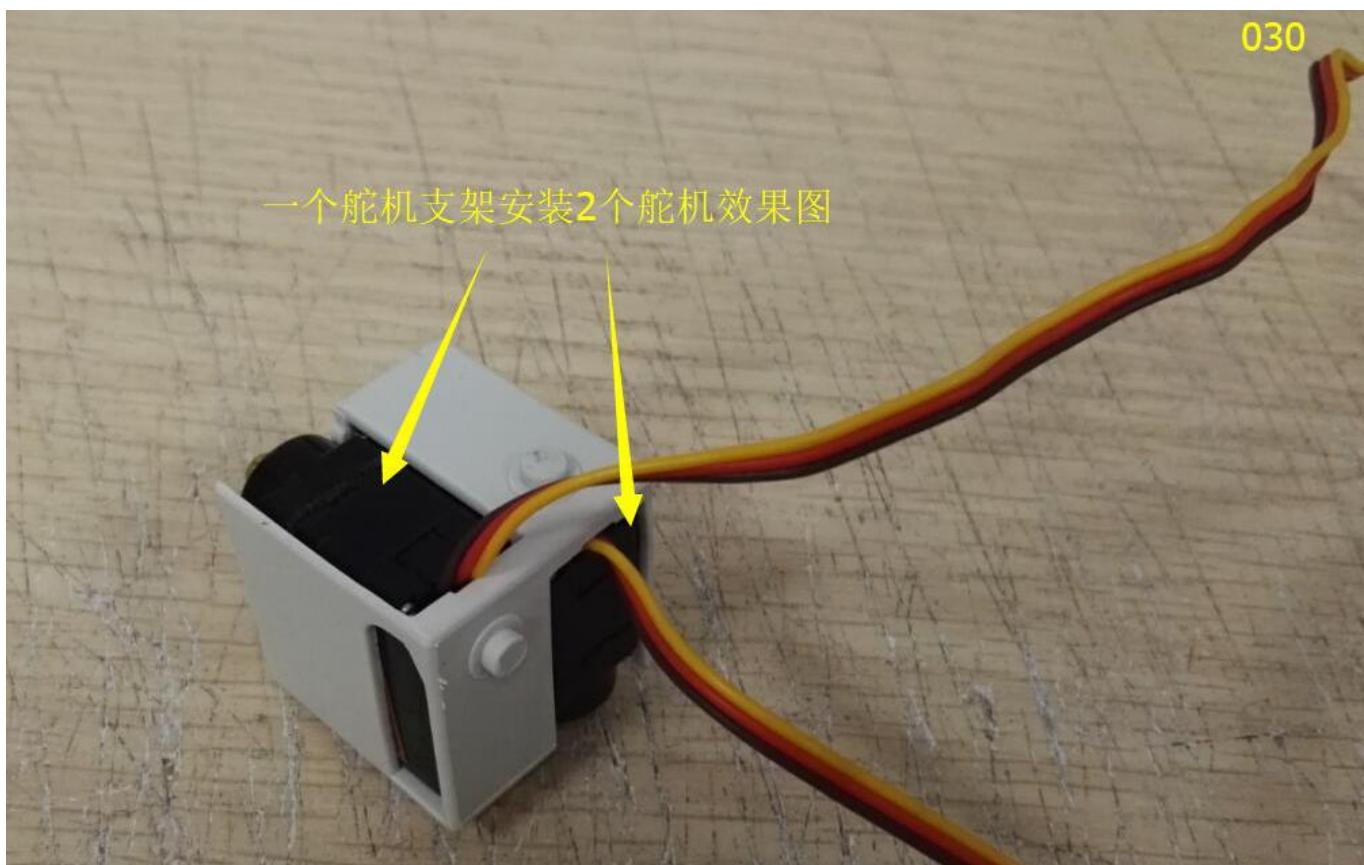
029

将另一个舵机按同样方法装到舵机支架上



030

一个舵机支架安装2个舵机效果图



031

同样方法分别给每个舵机支架装上2个舵机



032

将舵机塞进“左小腿”



033

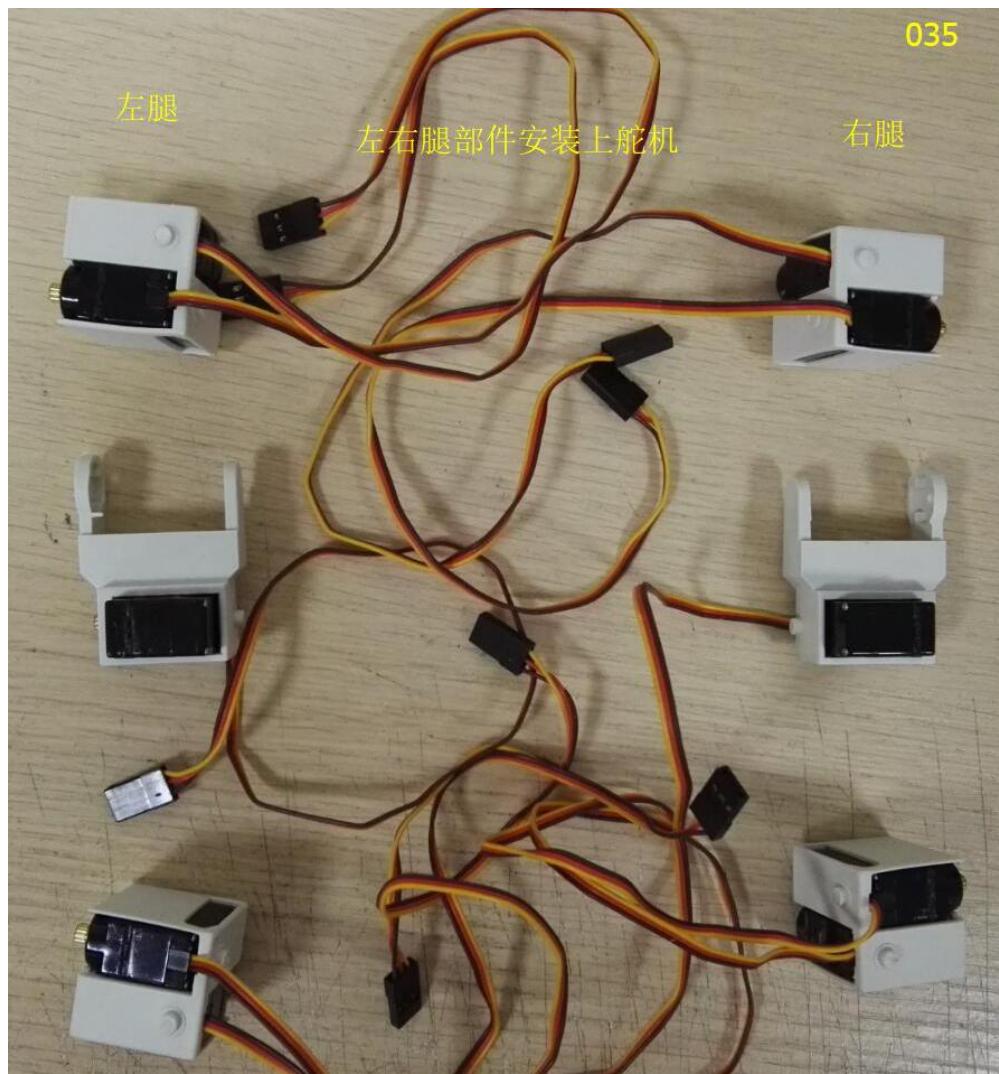
将舵机塞进“左小腿”

034

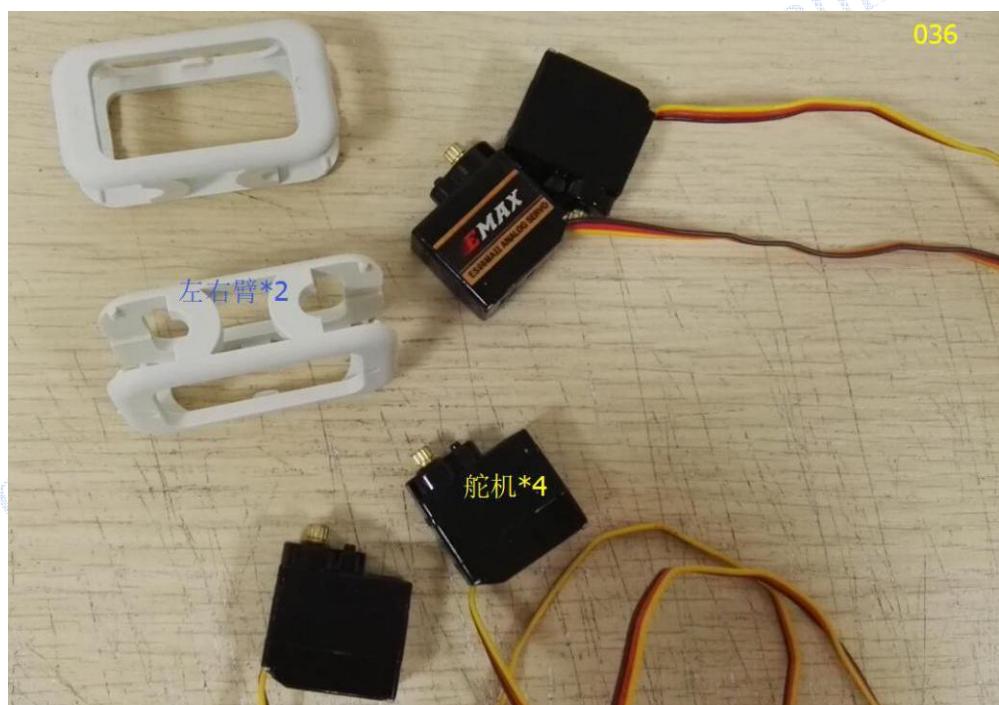
左右小腿都装上舵机

左小腿

右小腿



### c. arms



037

将舵机线紧贴舵机一侧，然后穿过手臂，  
注意舵机线位于凹槽处



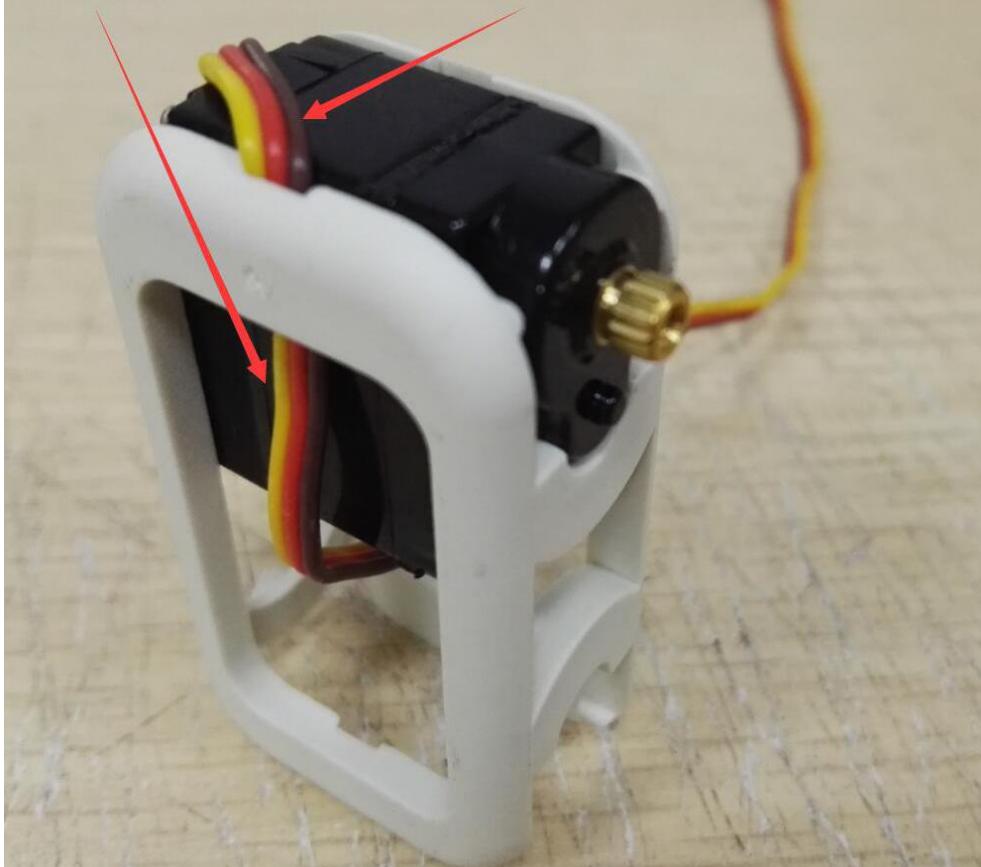
038

将舵机往下压紧



039

将舵机线往下拉紧，直至顶端的舵机线接口处较为平整



040

将2个舵机线都绕过两舵机中间的间隙往一边拉紧，  
然后将另一个舵机也同样方法安装

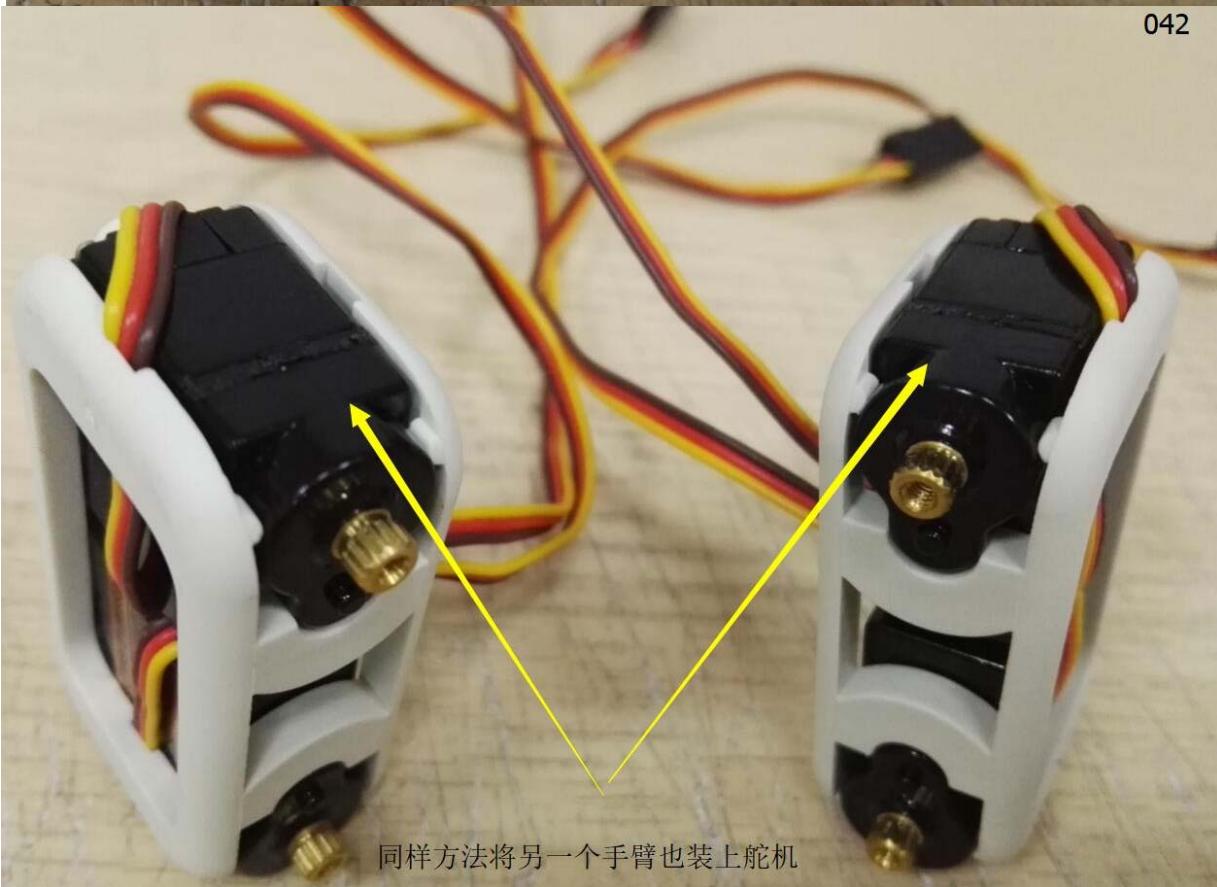


041

两舵机线往“手臂”的一侧拉紧



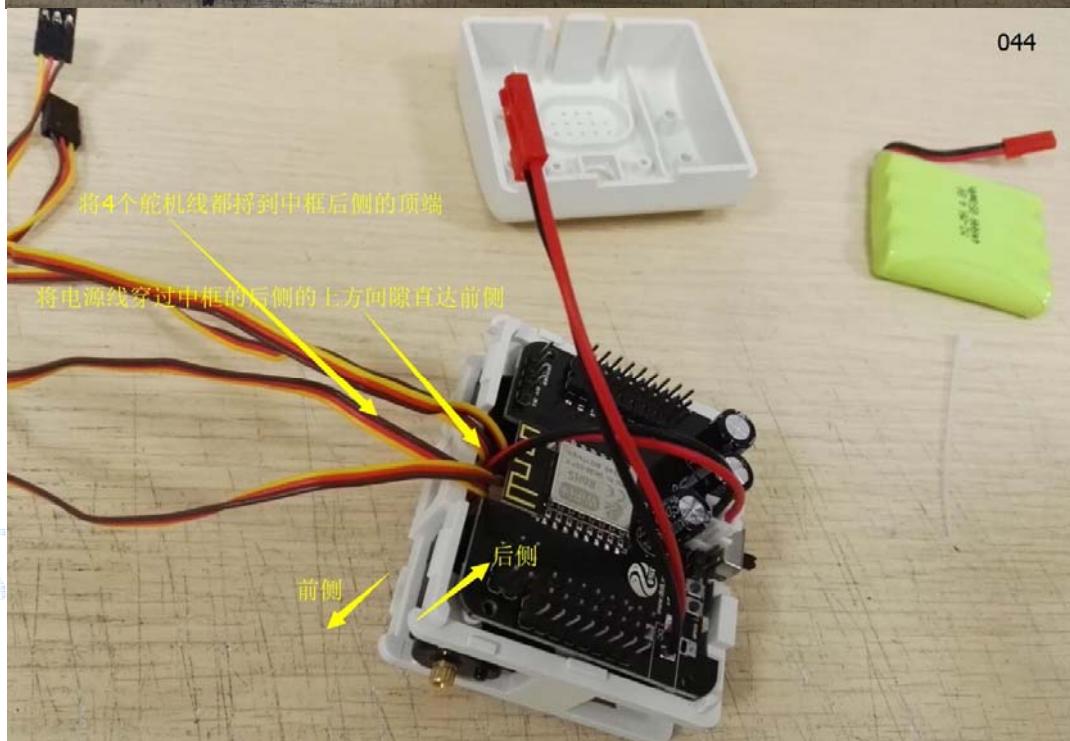
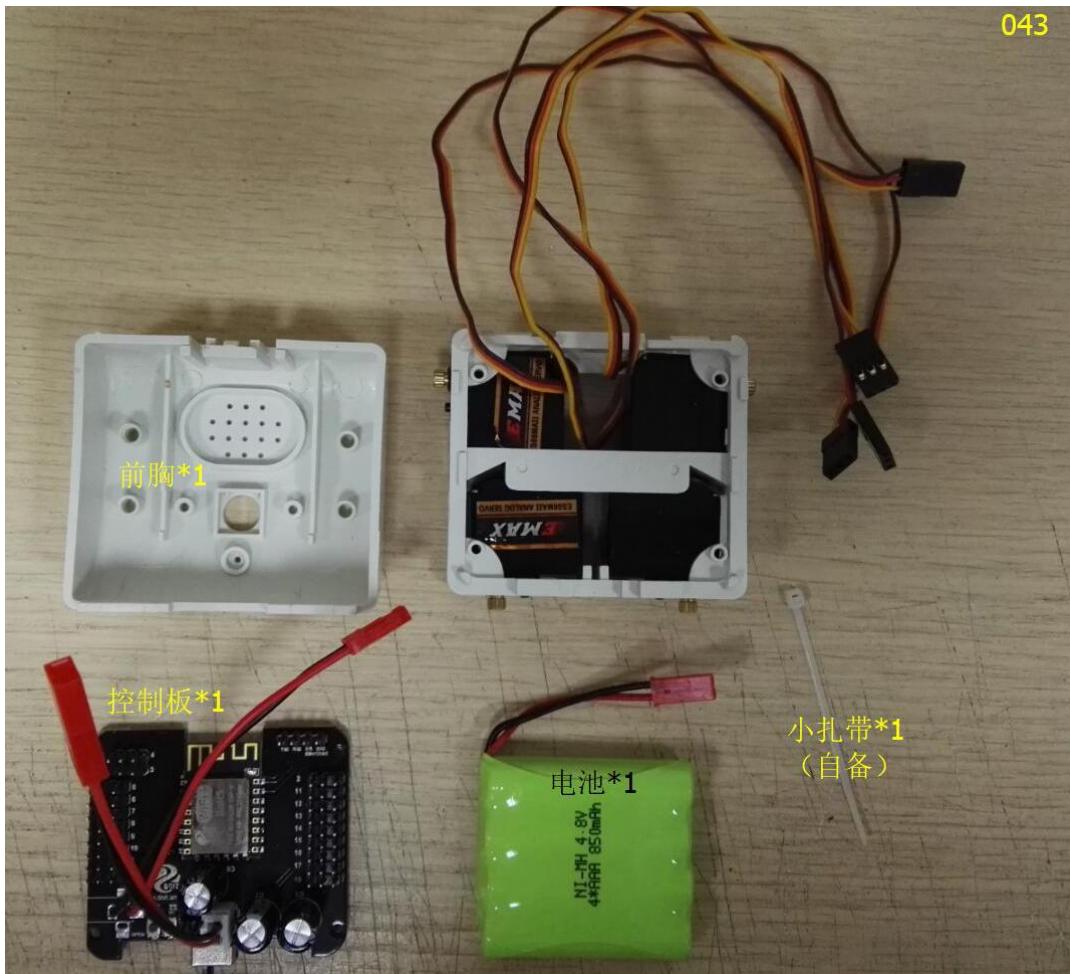
042



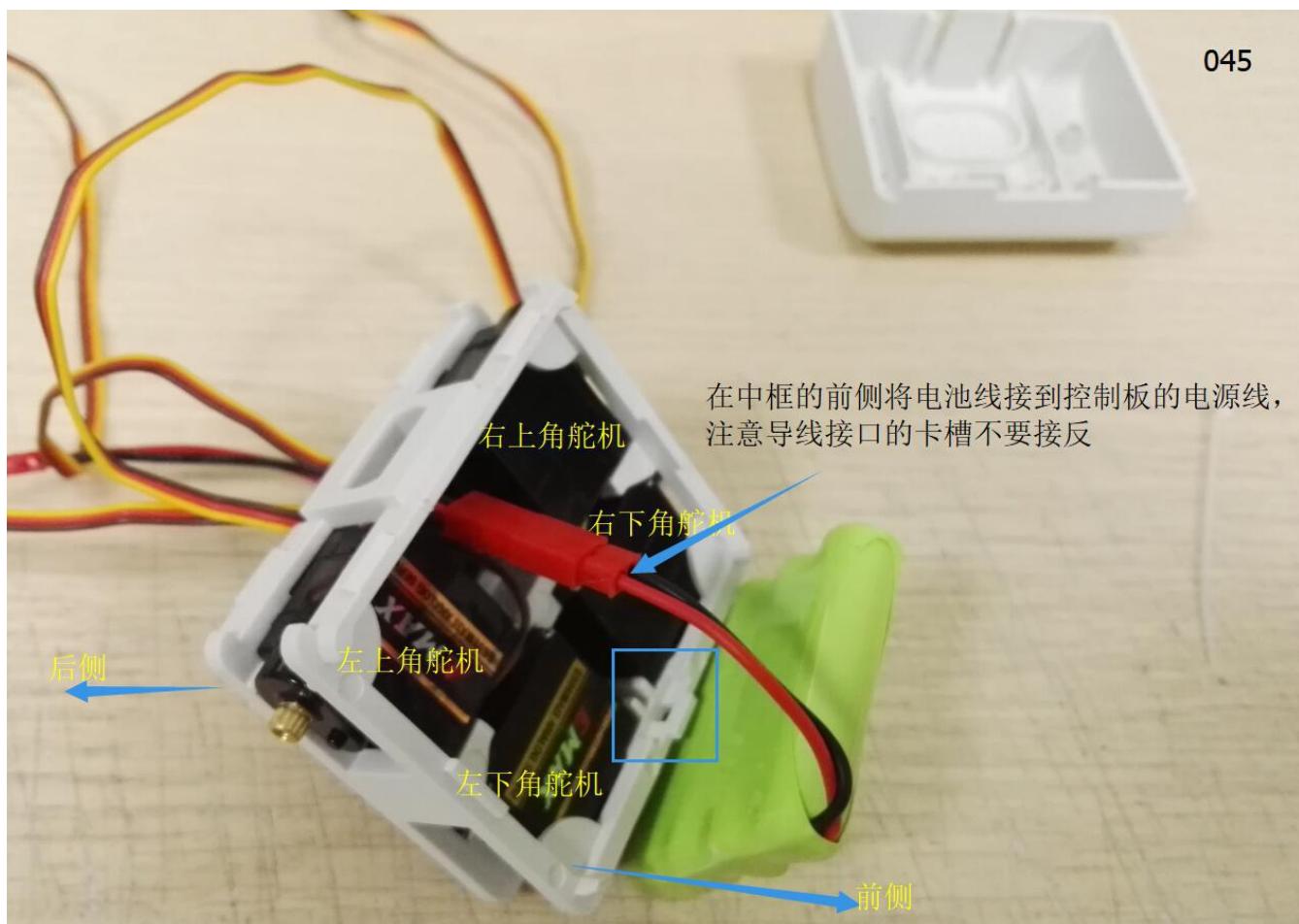
同样方法将另一个手臂也装上舵机

### 3) Joint Assembly

#### a. power

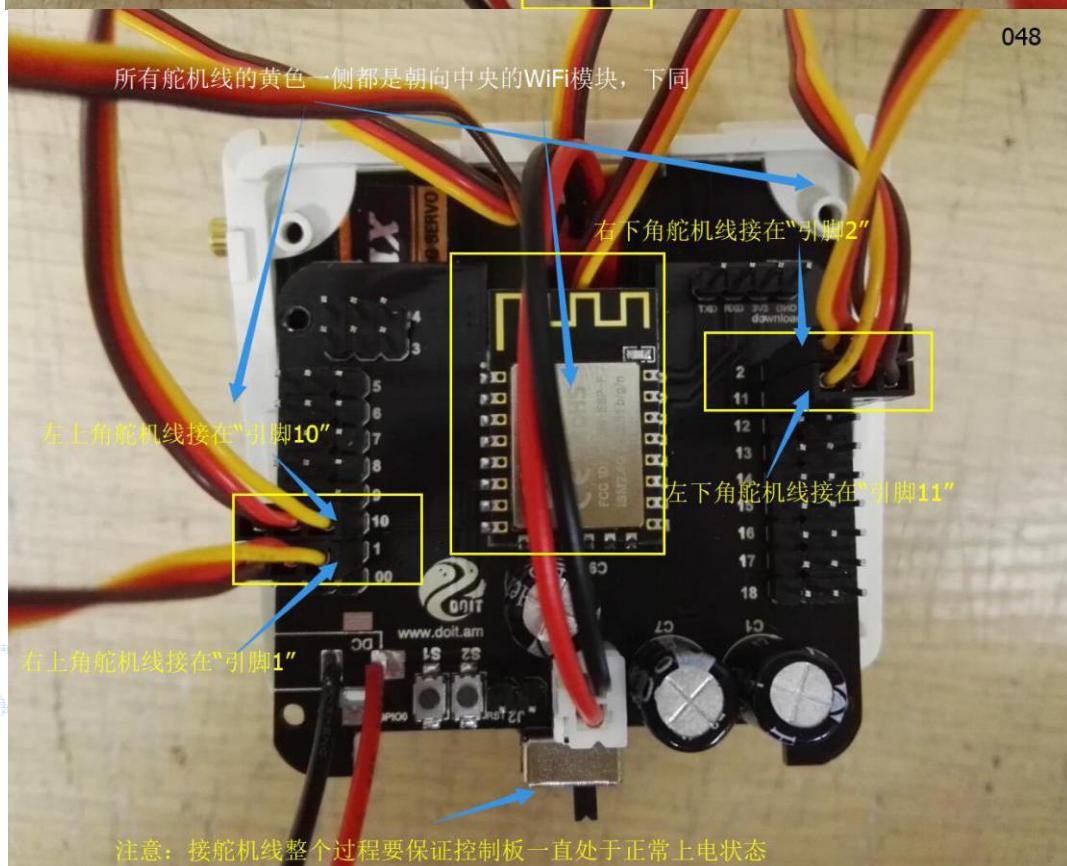
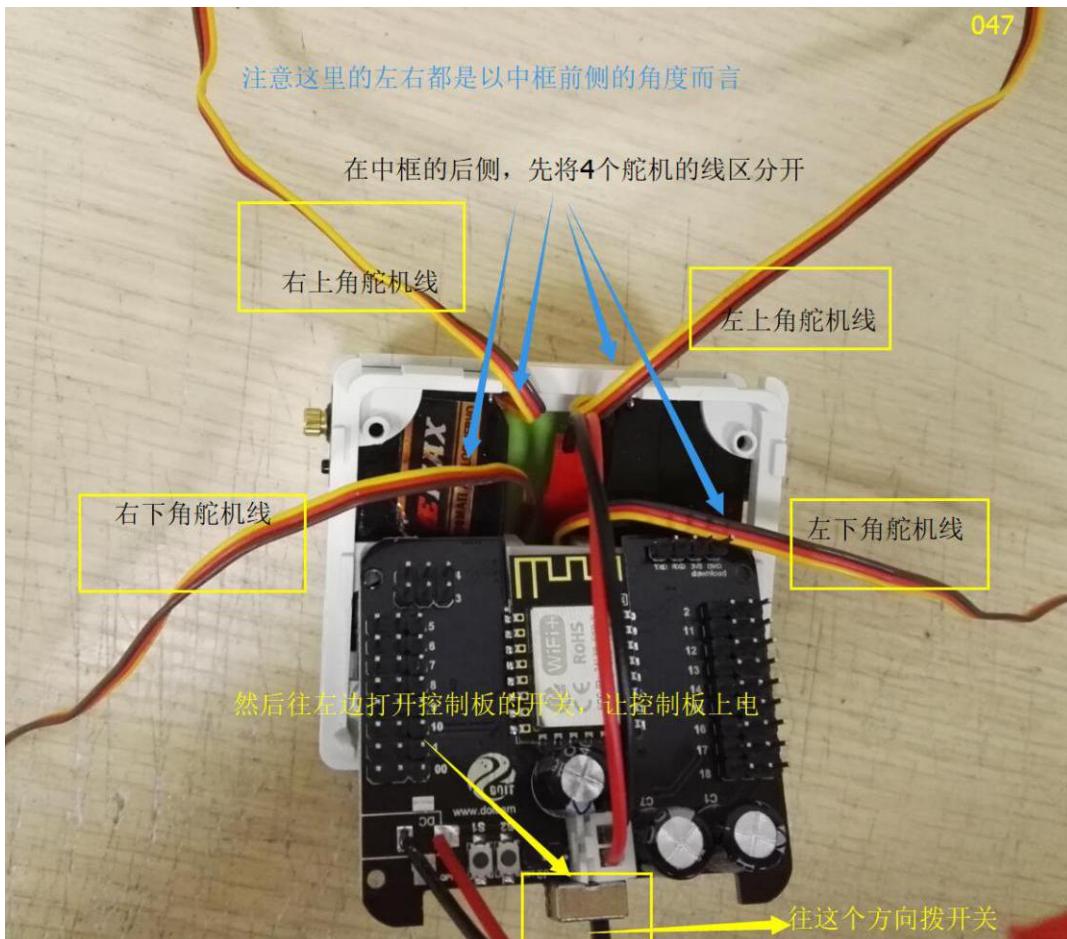


045



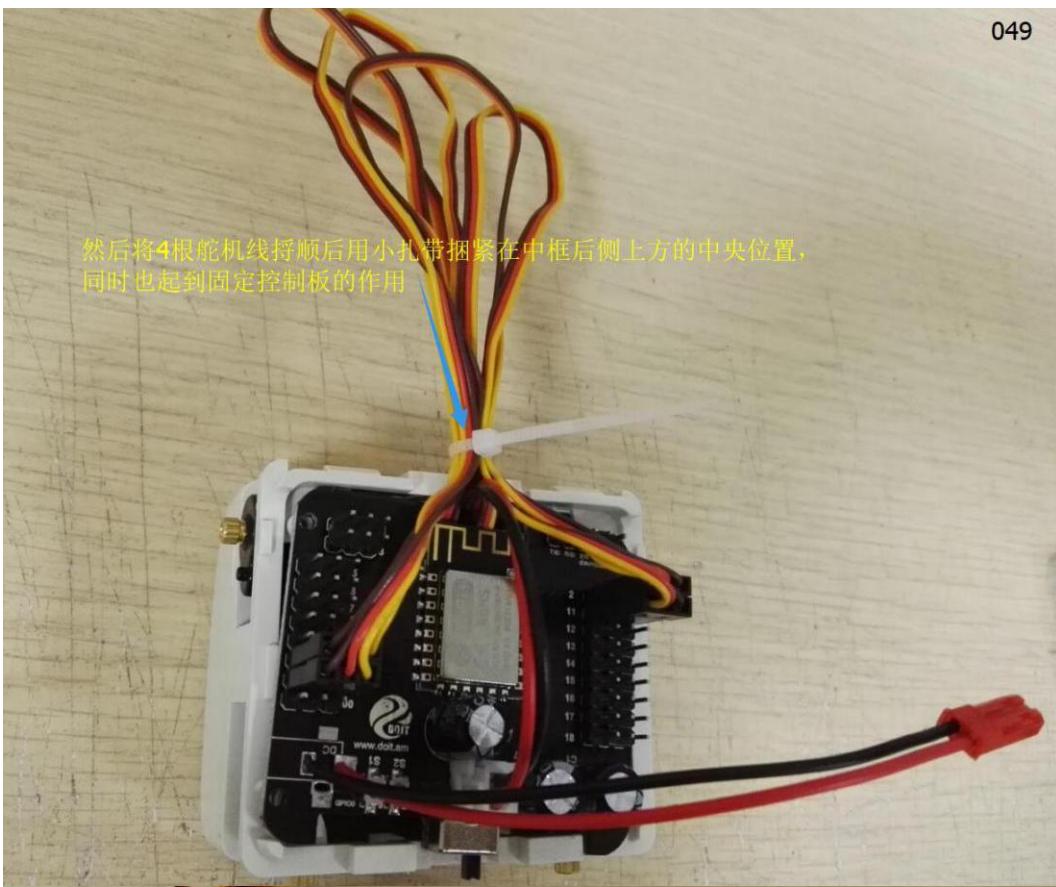
046



**b. power**

049

然后将4根舵机线捋顺后用小扎带捆紧在中框后侧上方的中央位置，同时也起到固定控制板的作用。

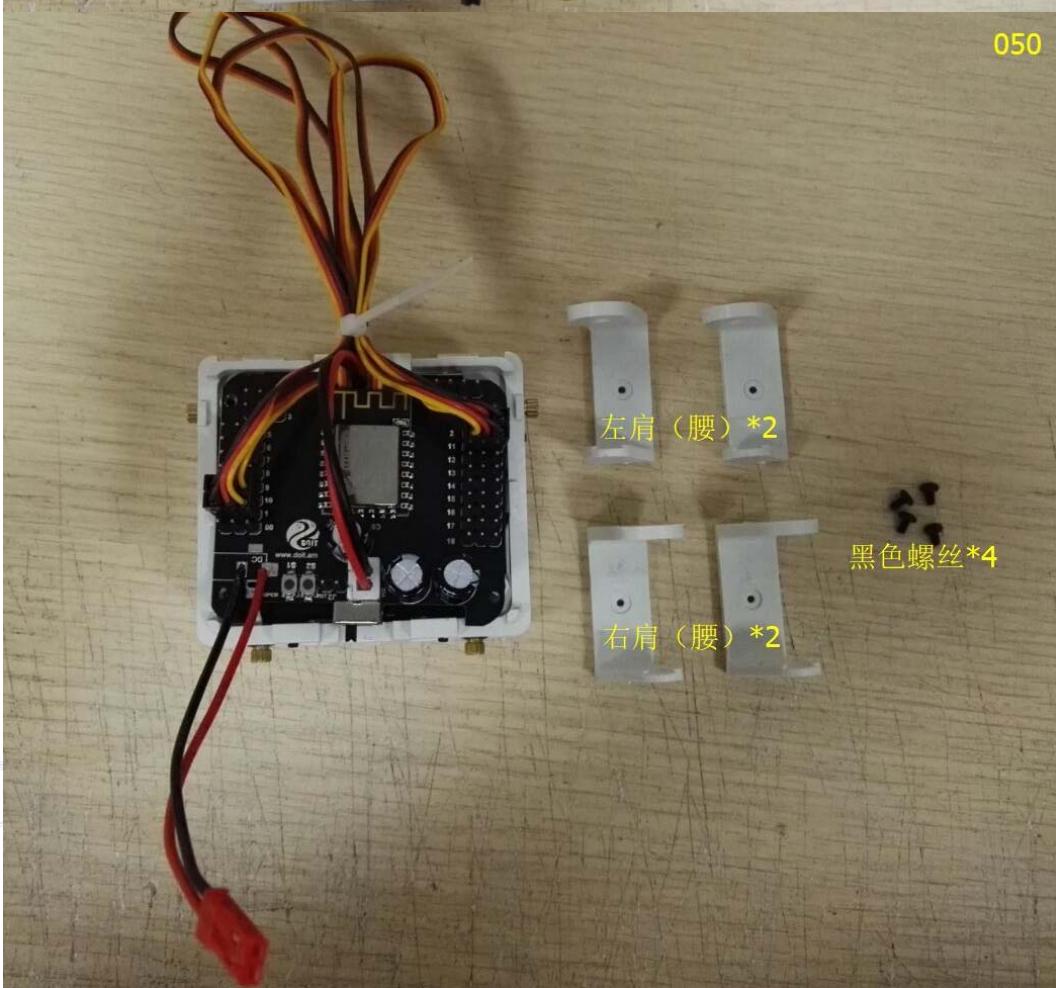


050

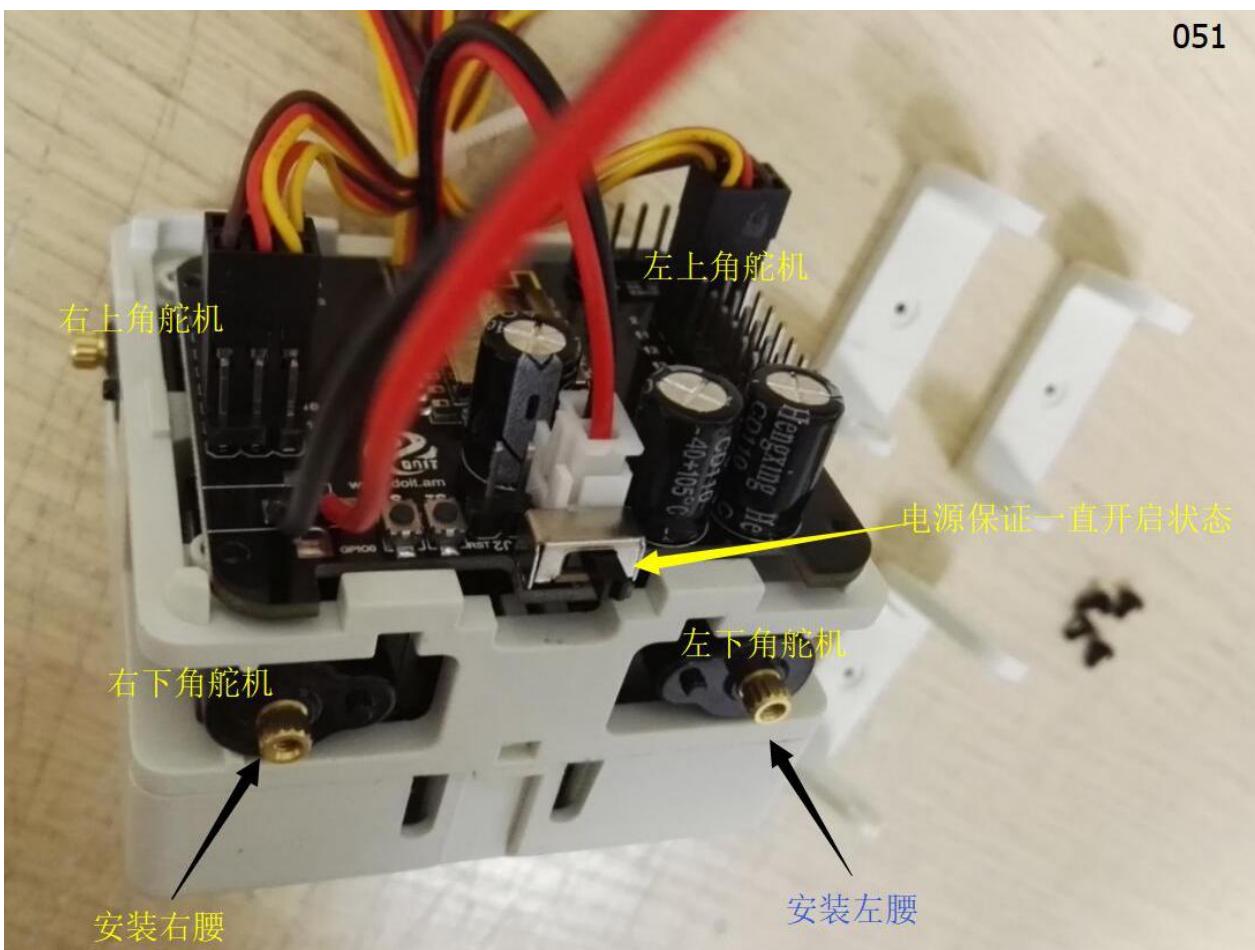
左肩（腰）\*2

黑色螺丝\*4

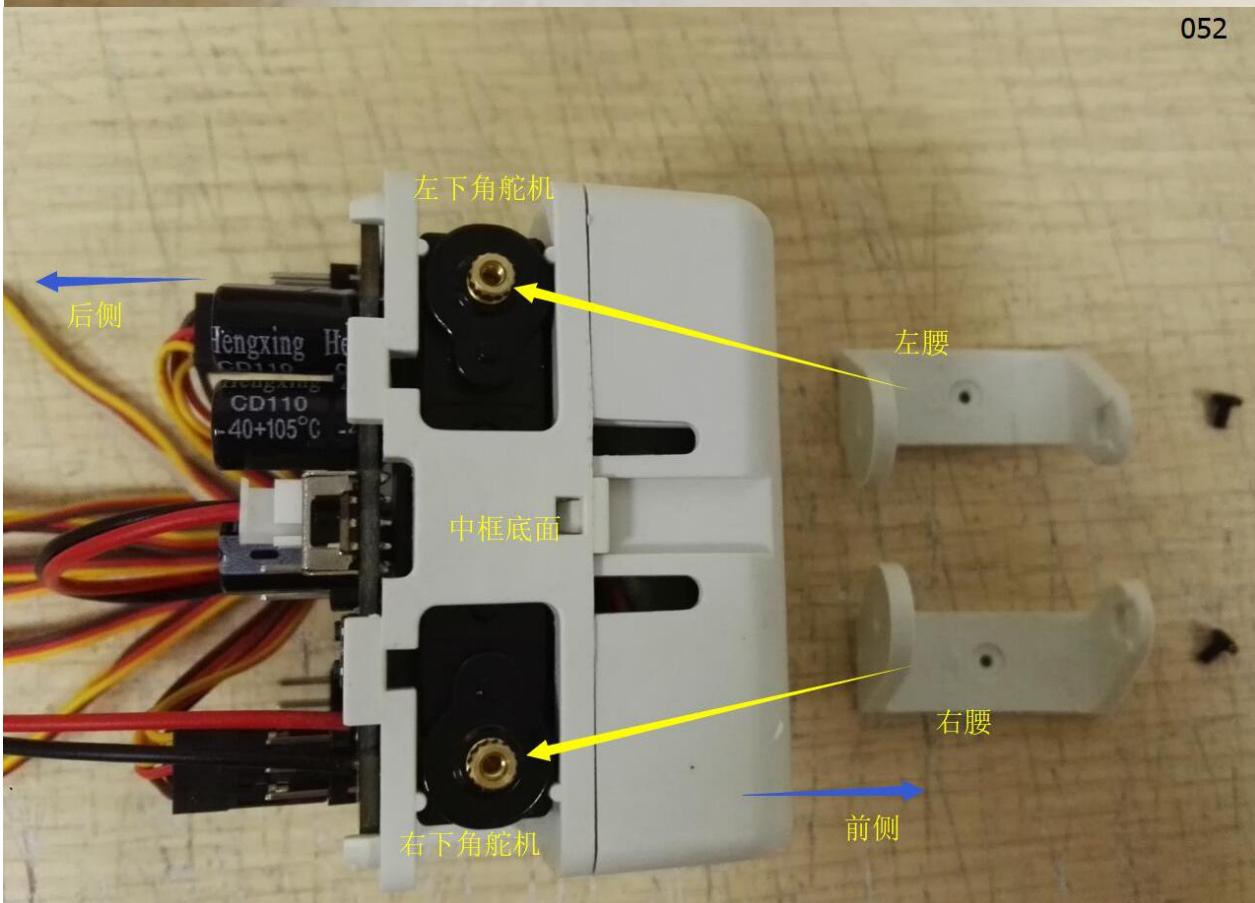
右肩（腰）\*2



051

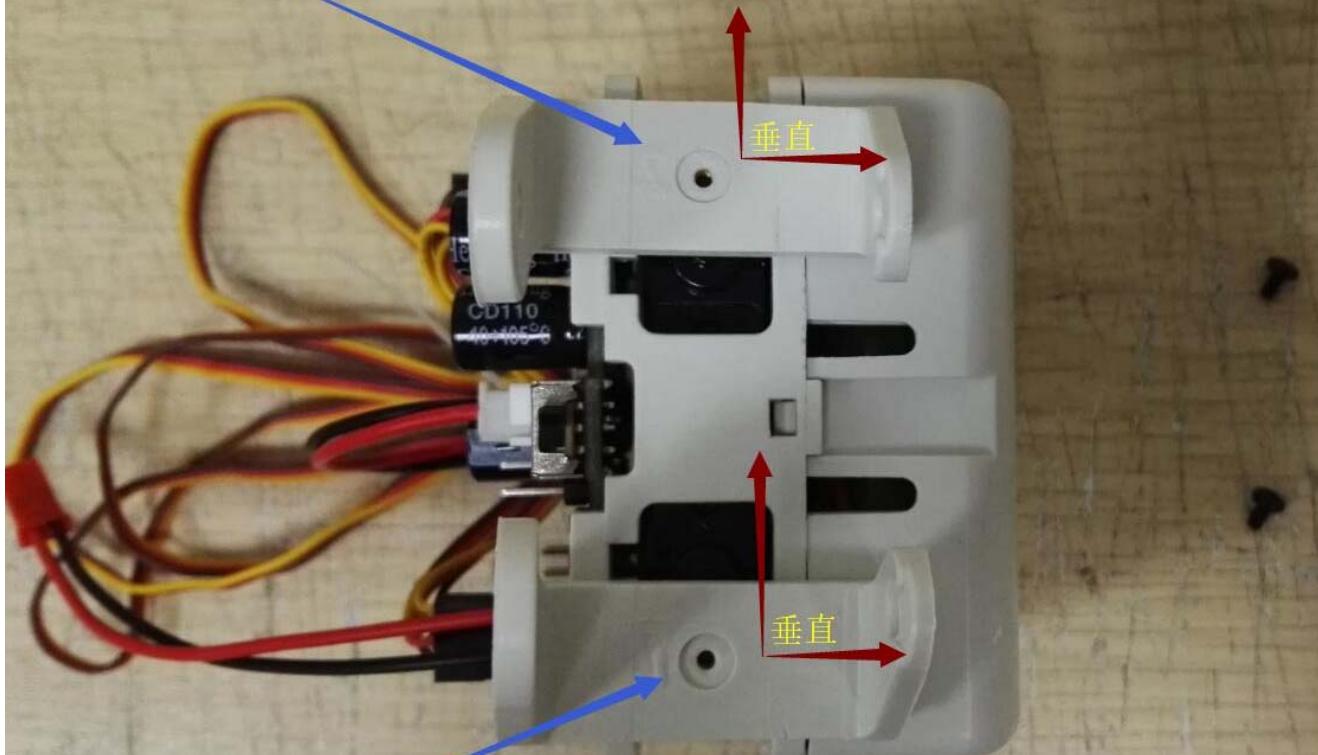


052



053

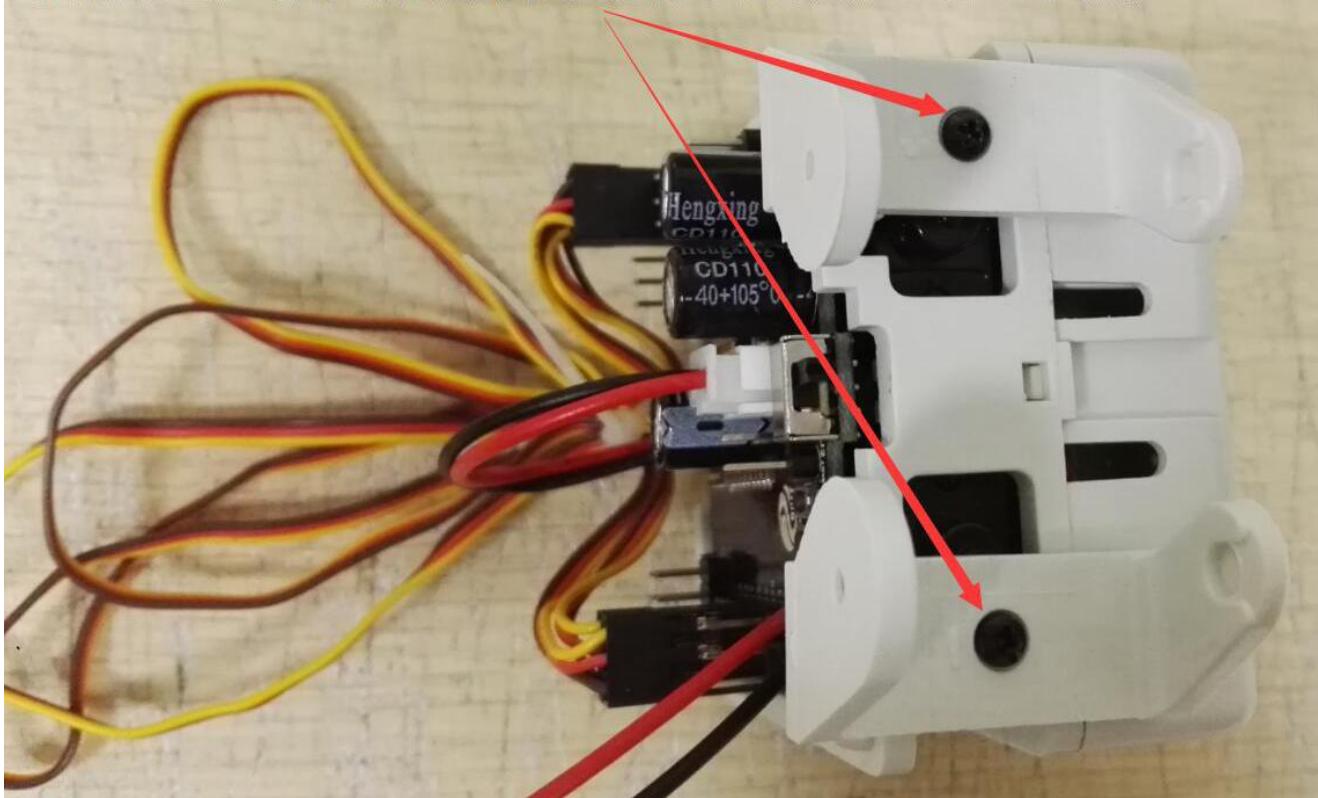
将左腰放在左下角舵机转轴上，尽可能让左腰与中框方向垂直，然后向下压紧左腰

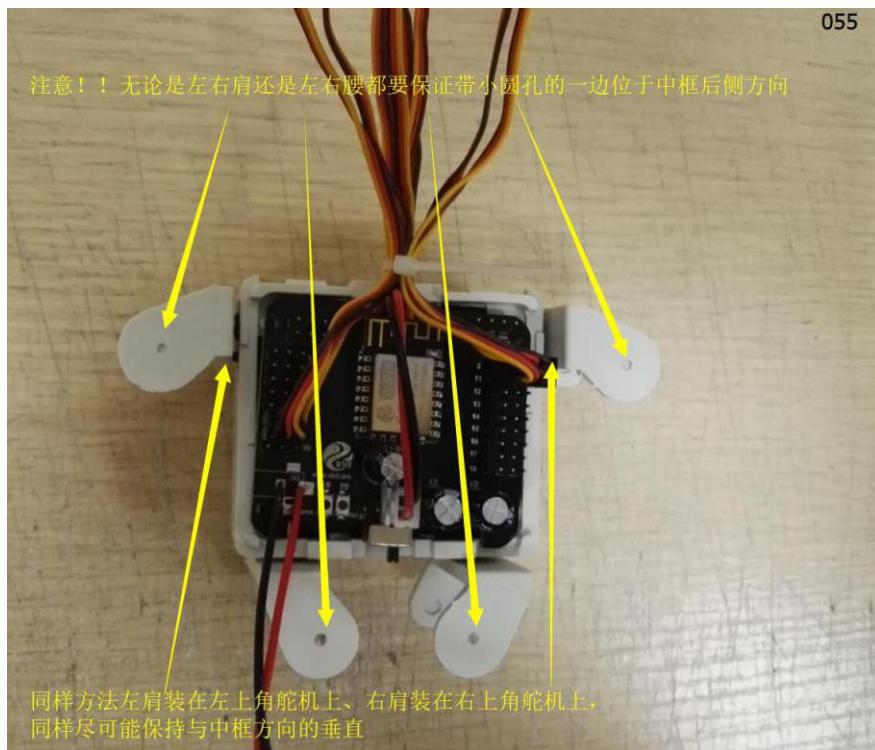


将右腰放在右下角舵机转轴上，尽可能让右腰与中框方向垂直，然后向下压紧右腰

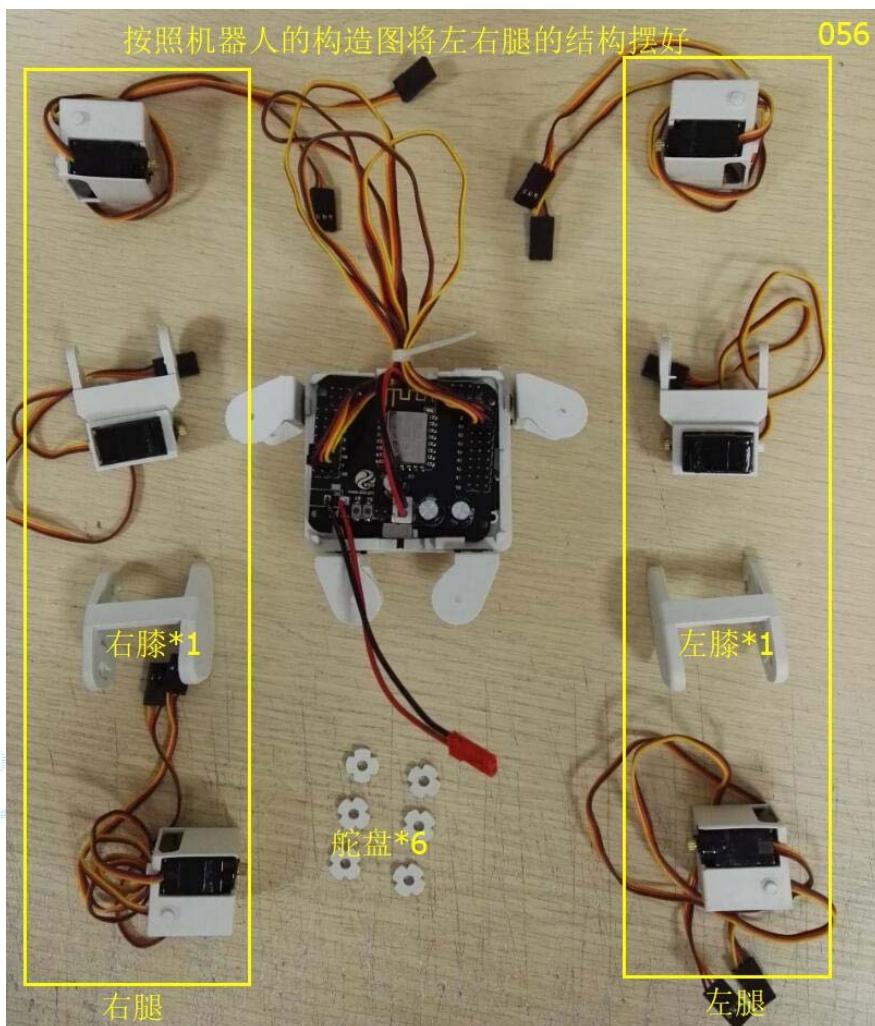
054

然后用黑色螺丝将两个腰固定到对应舵机上，注意此处螺丝必须尽可能拧紧！！

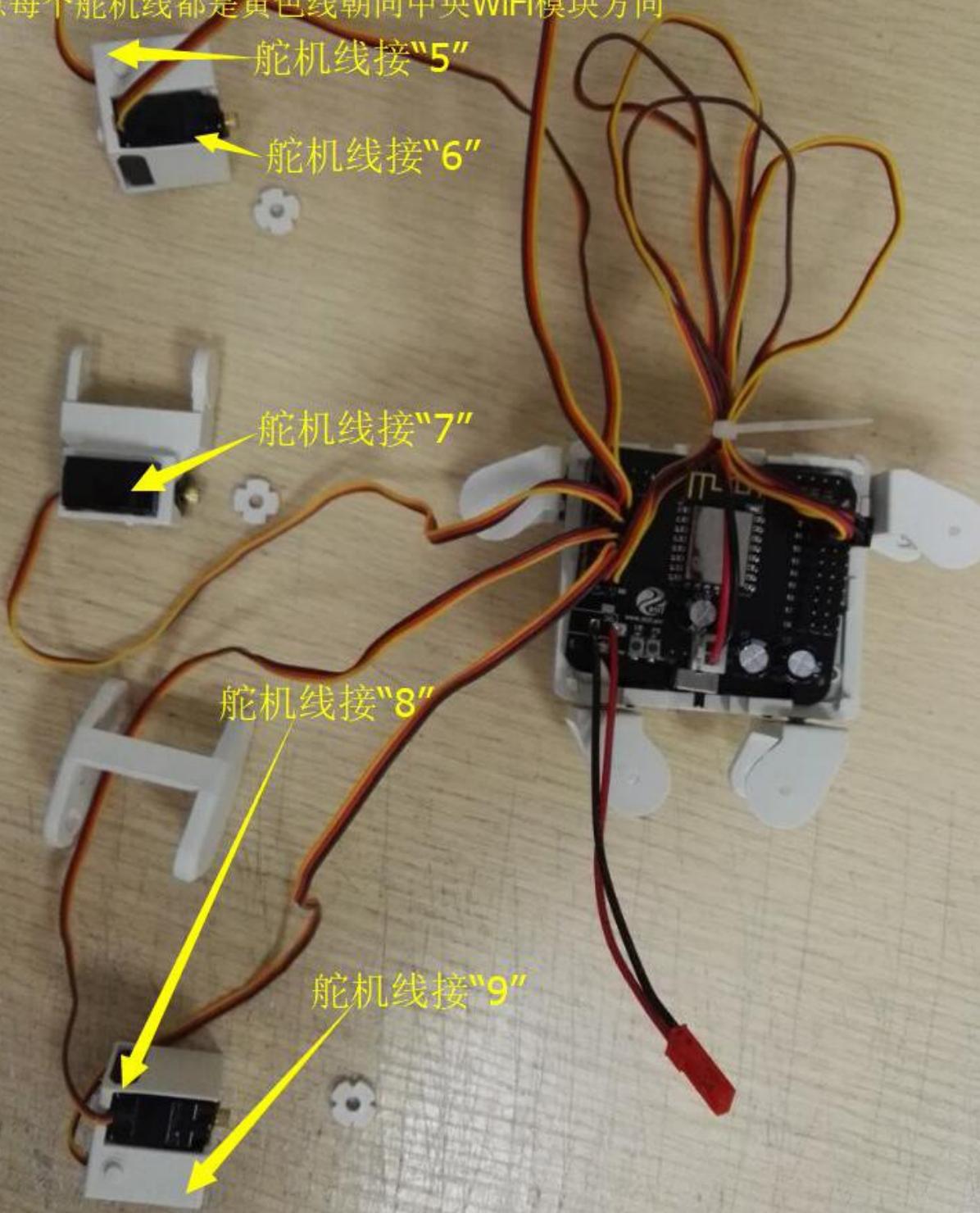




### c. power

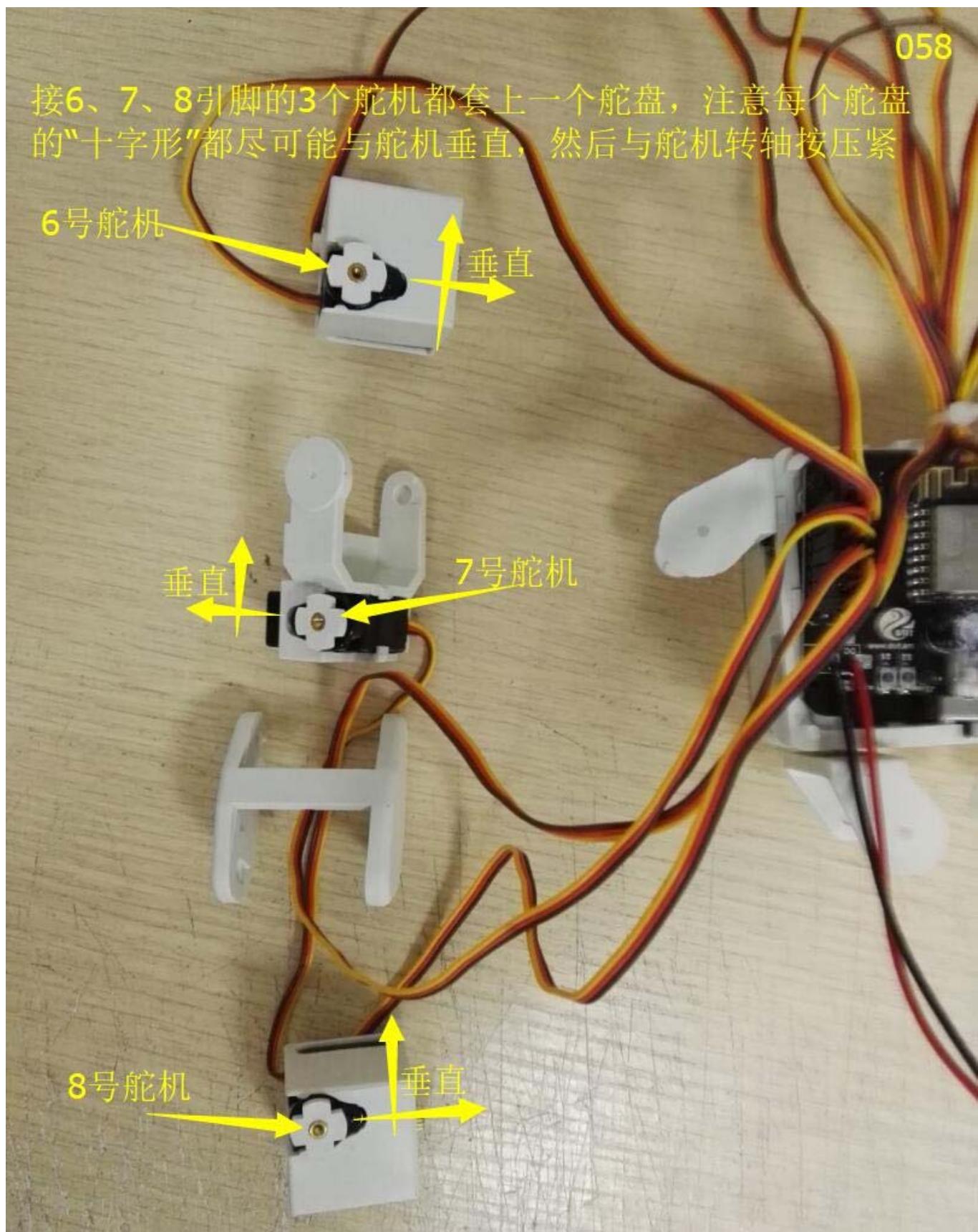


如图，将机器人右腿的结构顺序摆好后，对照手机APP“vivi机器人”中开发者模式的示意图从上往下将舵机线接到控制板接线端的5~9，注意每个舵机线都是黄色线朝向中央WiFi模块方向



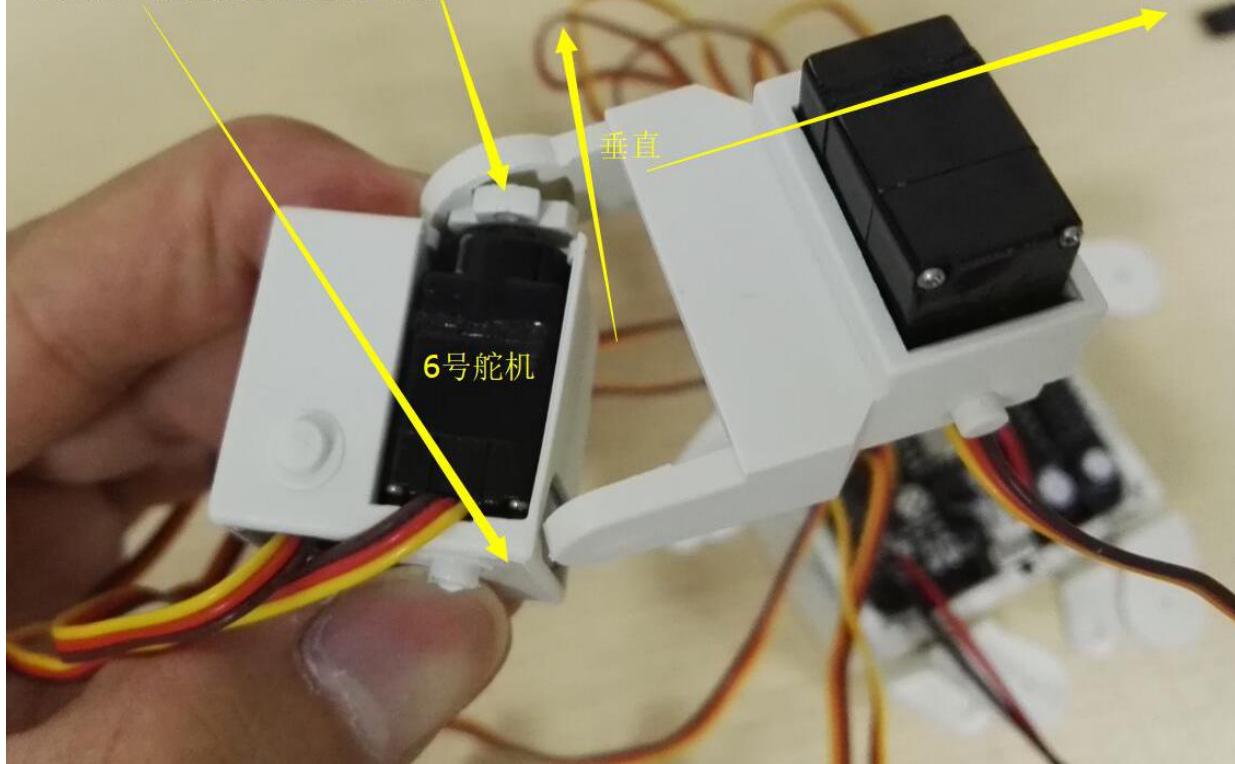
058

接6、7、8引脚的3个舵机都套上一个舵盘，注意每个舵盘的“十字形”都尽可能与舵机垂直，然后与舵机转轴按压紧



059

让右小腿与6号舵机所在支架垂直，  
将右小腿一边扣上6号舵机的舵盘，  
然后另一边用力往里推进扣住



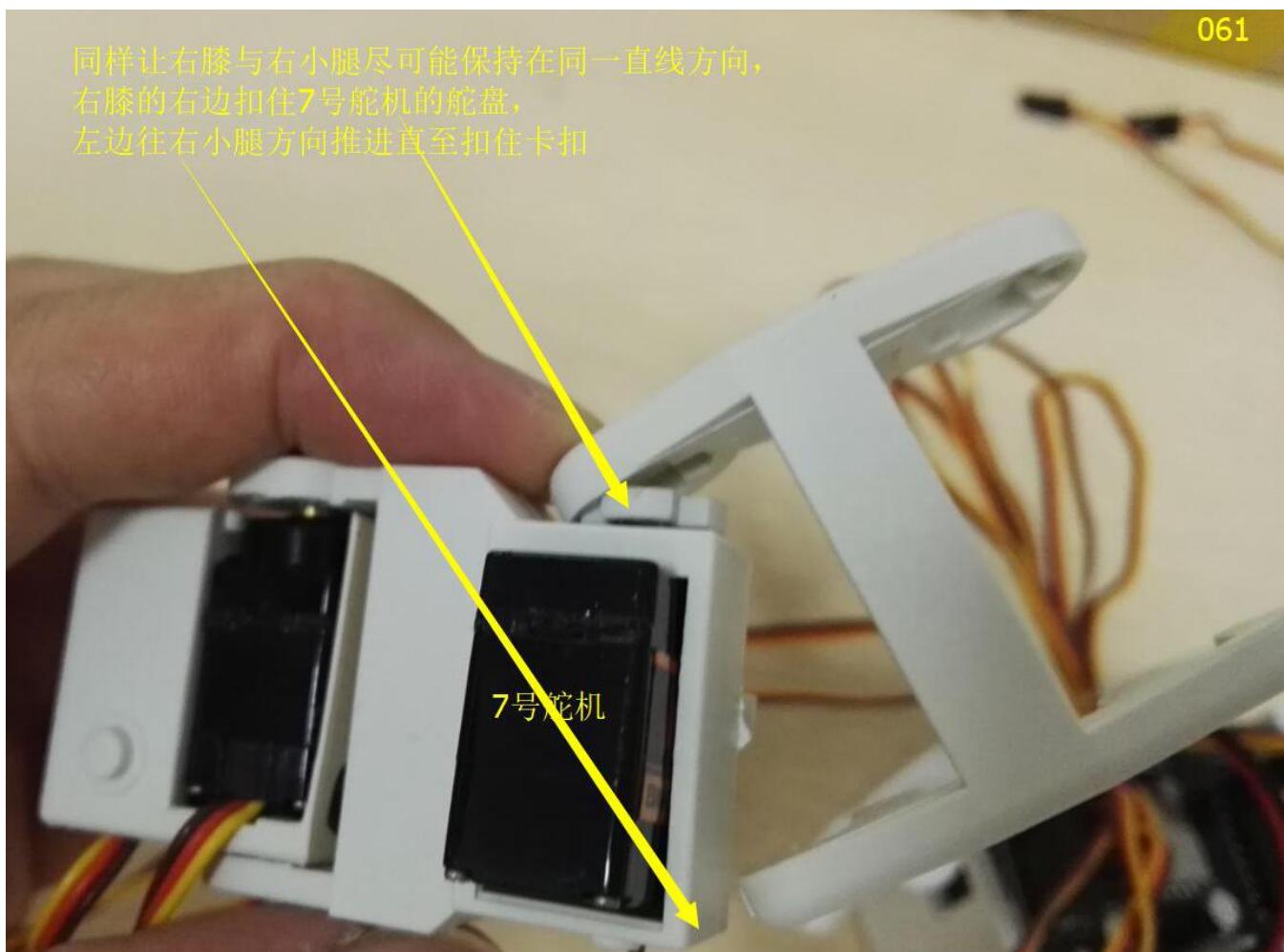
060

将右小腿另一边（左边）往支架方向推进，扣住卡扣，  
让小腿与舵机支架的水平方向尽可能保持垂直

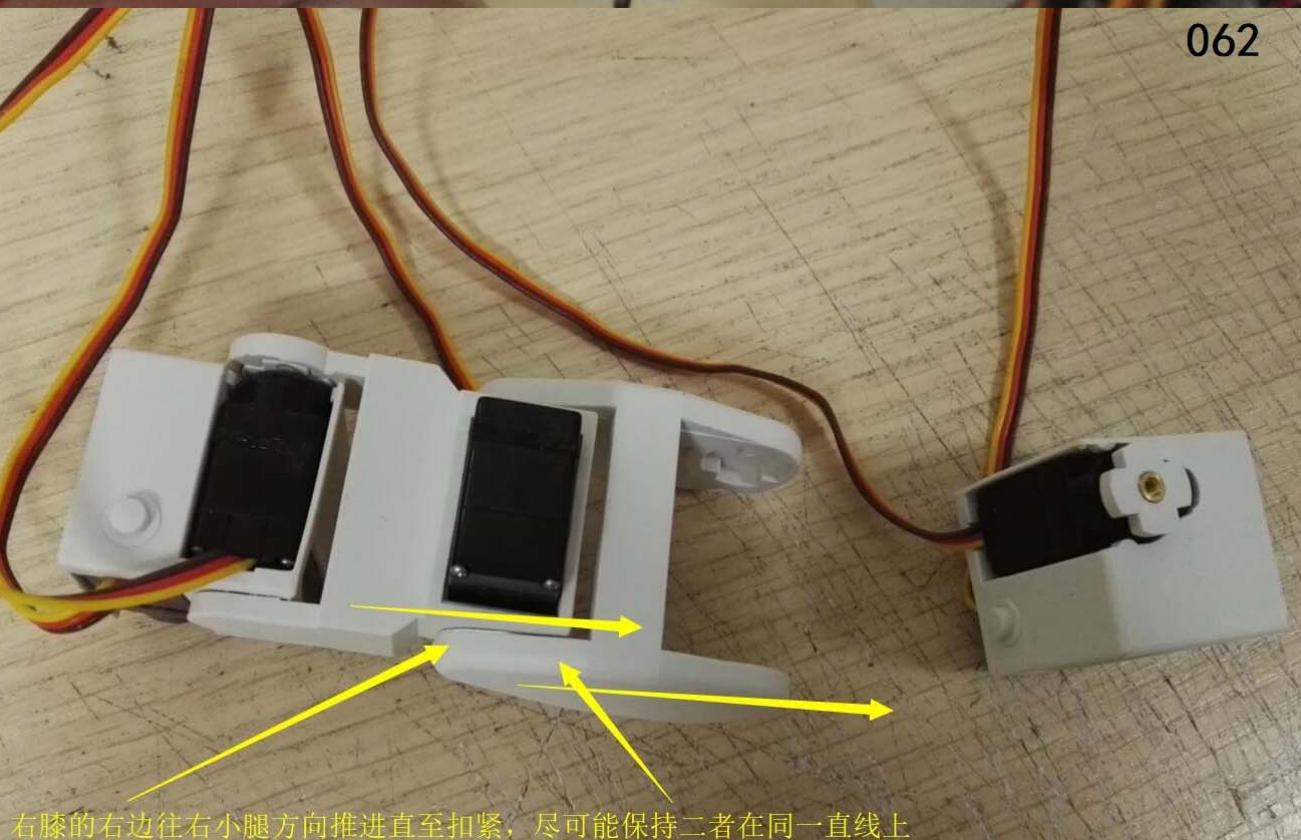


061

同样让右膝与右小腿尽可能保持在同一直线方向，  
右膝的右边扣住7号舵机的舵盘，  
左边往右小腿方向推进直至扣住卡扣



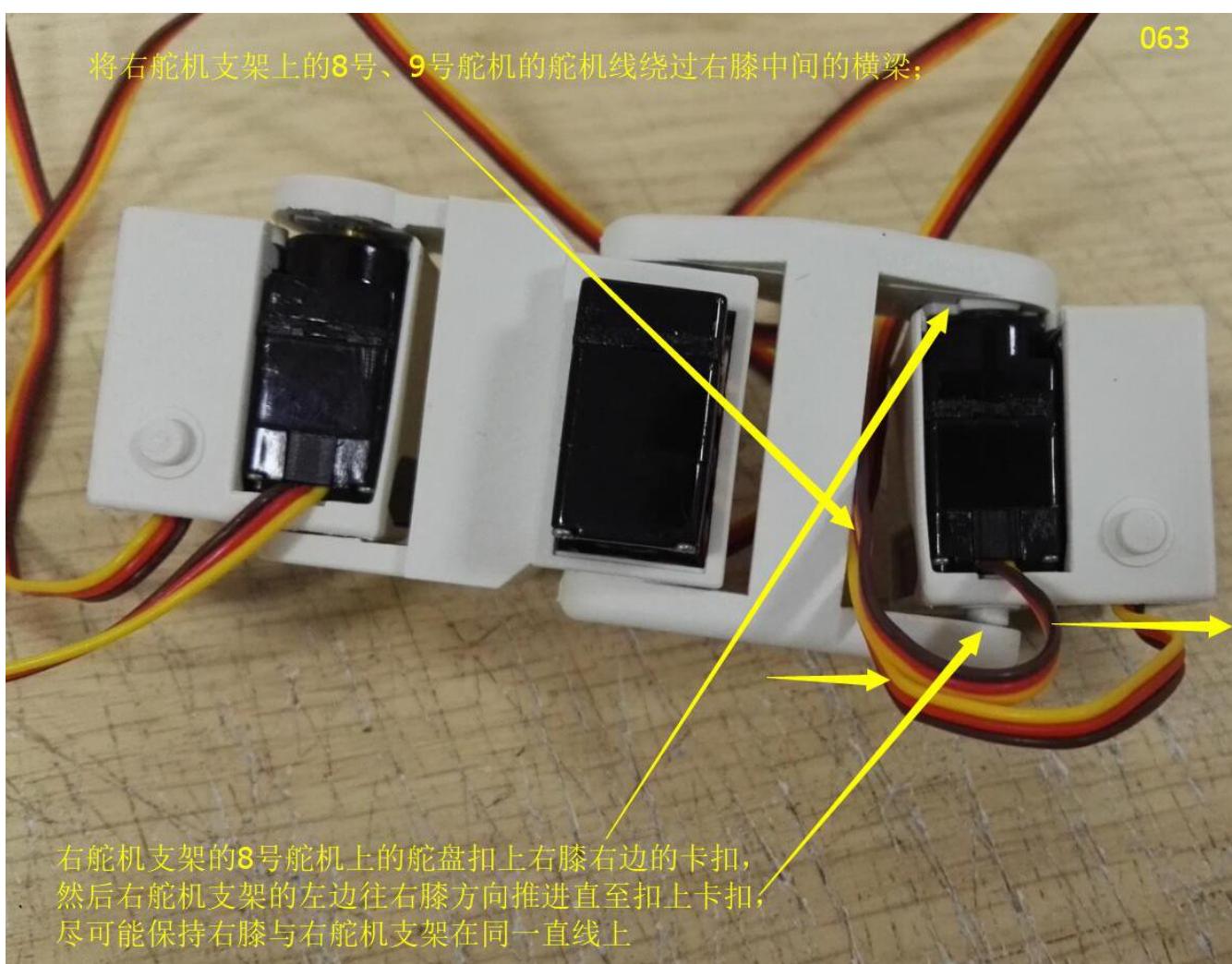
062



右膝的右边往右小腿方向推进直至扣紧，尽可能保持二者在同一直线上

063

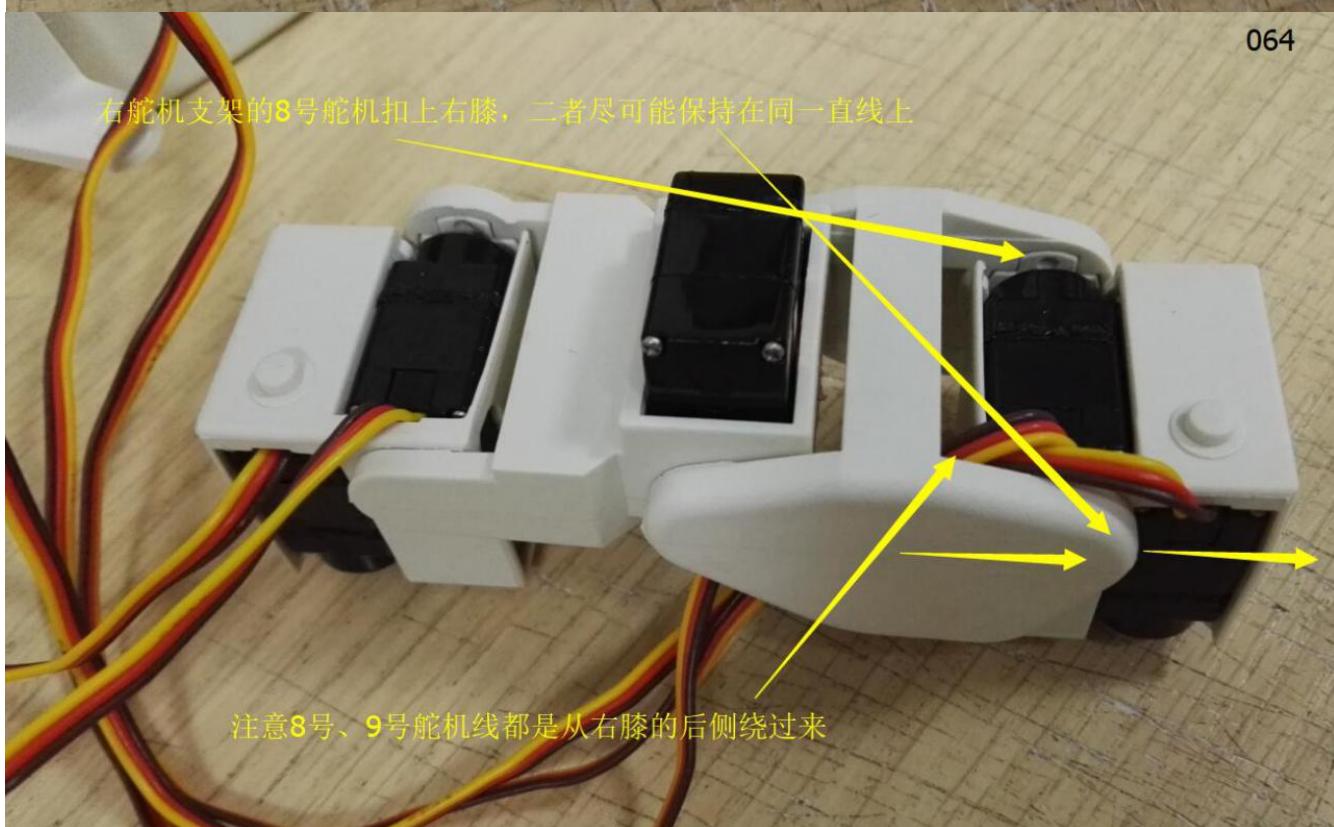
将右舵机支架上的8号、9号舵机的舵机线绕过右膝中间的横梁；



右舵机支架的8号舵机上的舵盘扣上右膝右边的卡扣，  
然后右舵机支架的左边往右膝方向推进直至扣上卡扣，  
尽可能保持右膝与右舵机支架在同一直线上

064

右舵机支架的8号舵机扣上右膝，二者尽可能保持在同一直线上



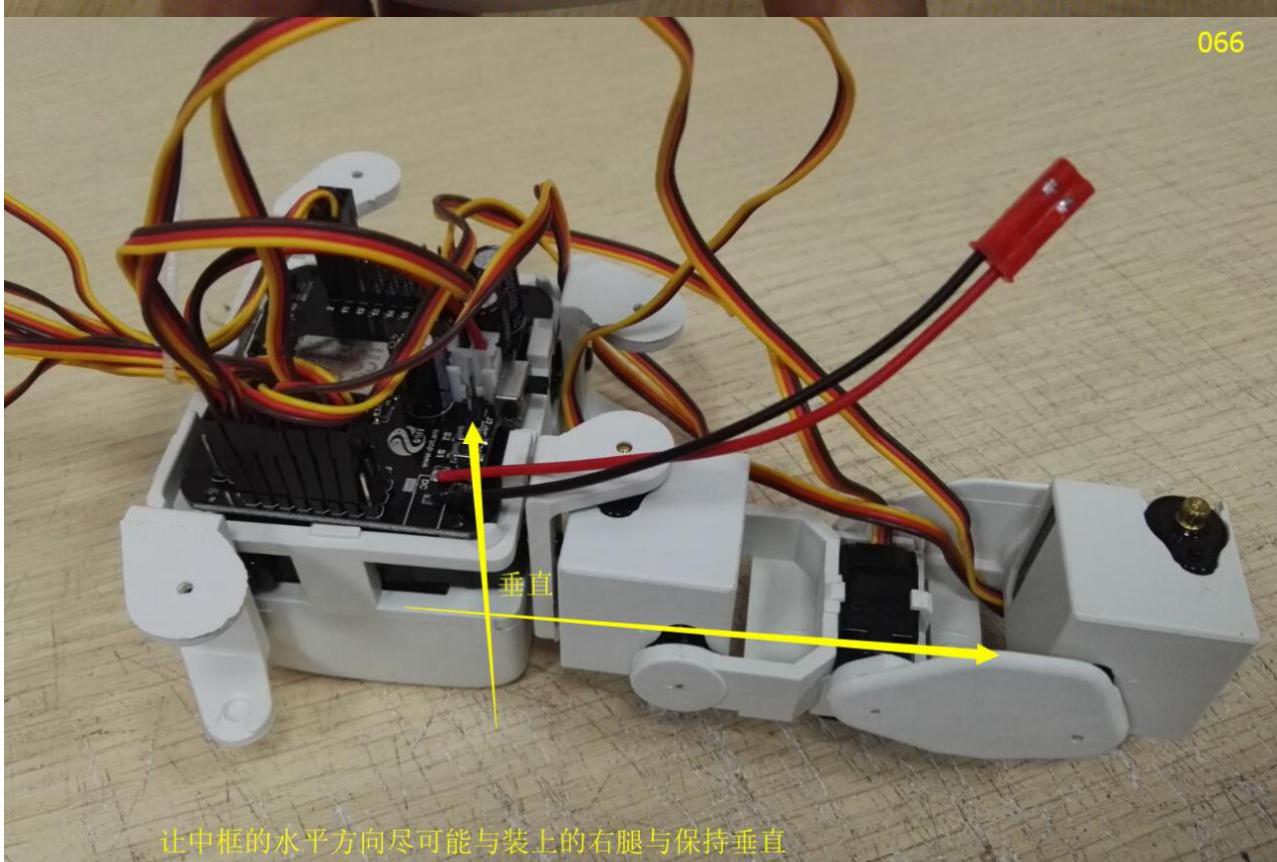
注意8号、9号舵机线都是从右膝的后侧绕过来

065

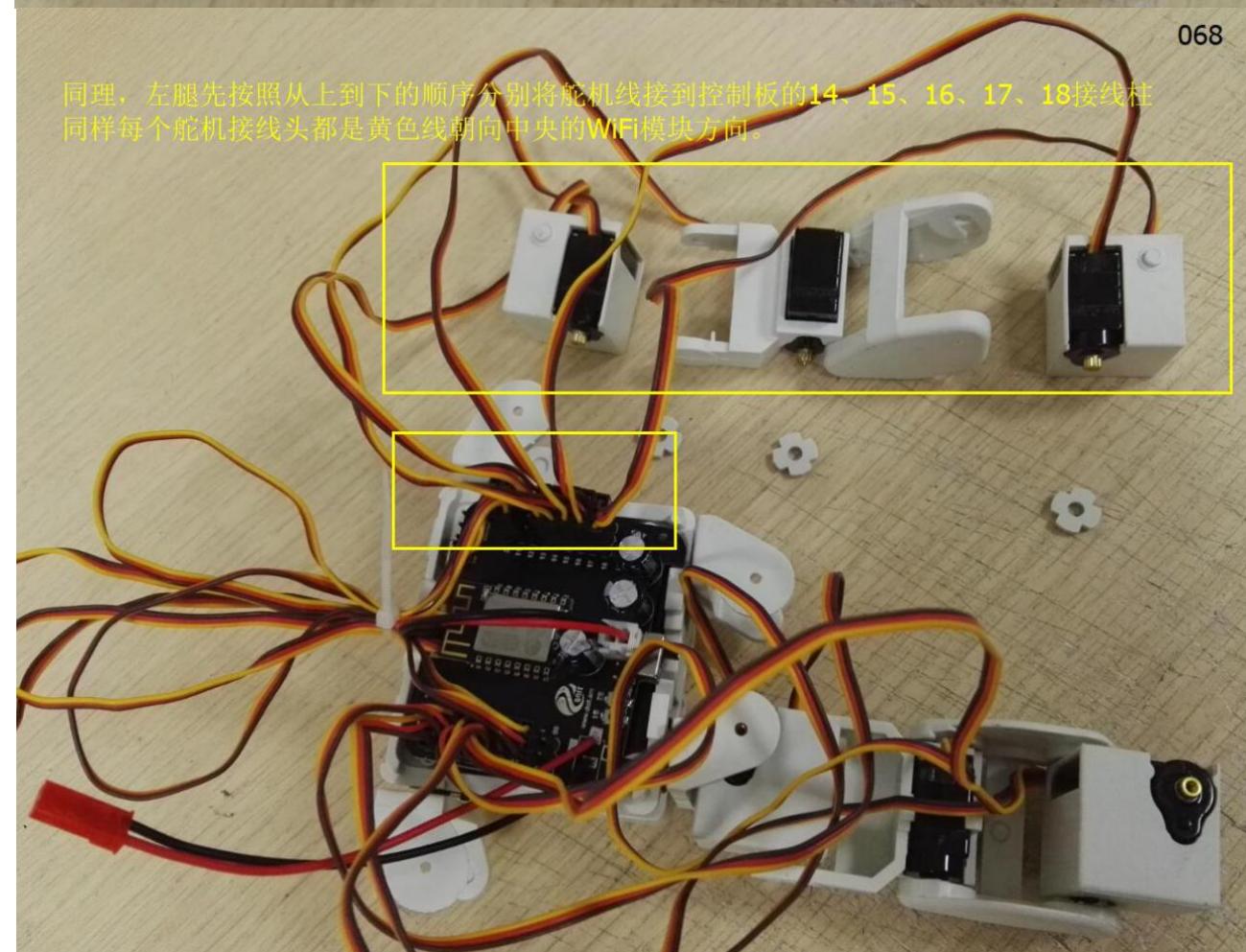
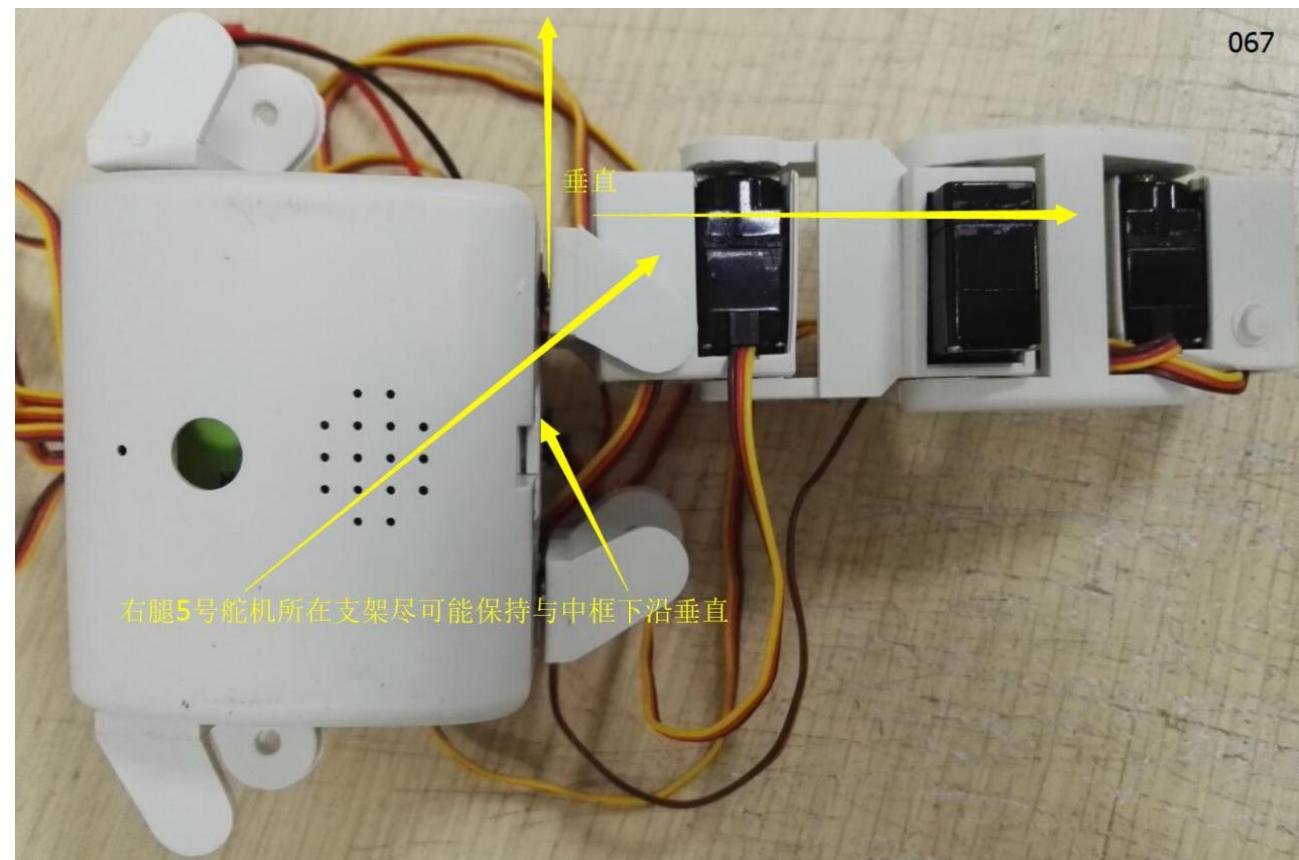
将右腿上的**5号舵机**从舵机转轴的一侧扣上机器人的右腰，  
注意舵机转轴位于中框的后侧方向，



066

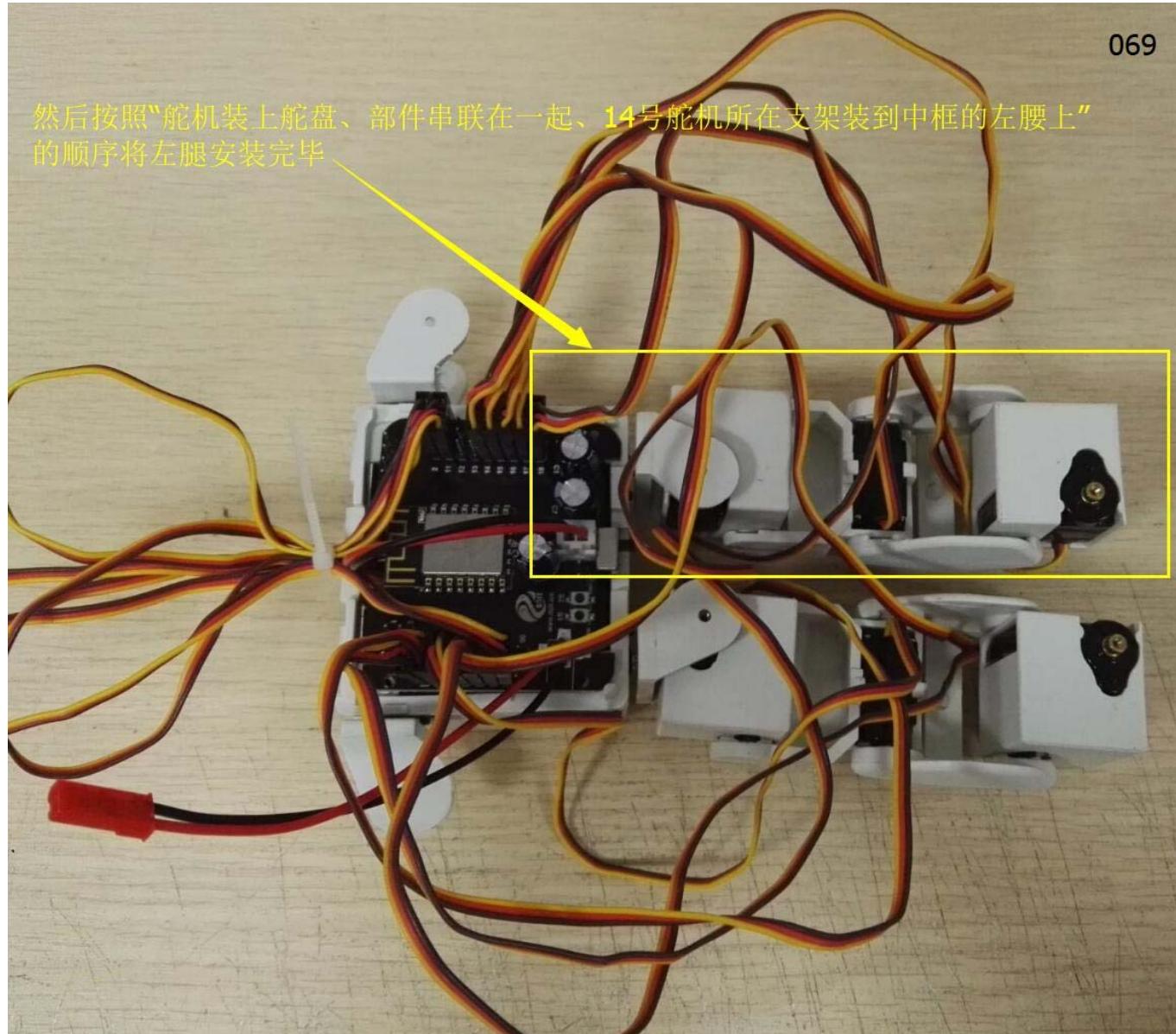


让中框的水平方向尽可能与装上的右腿与保持垂直



069

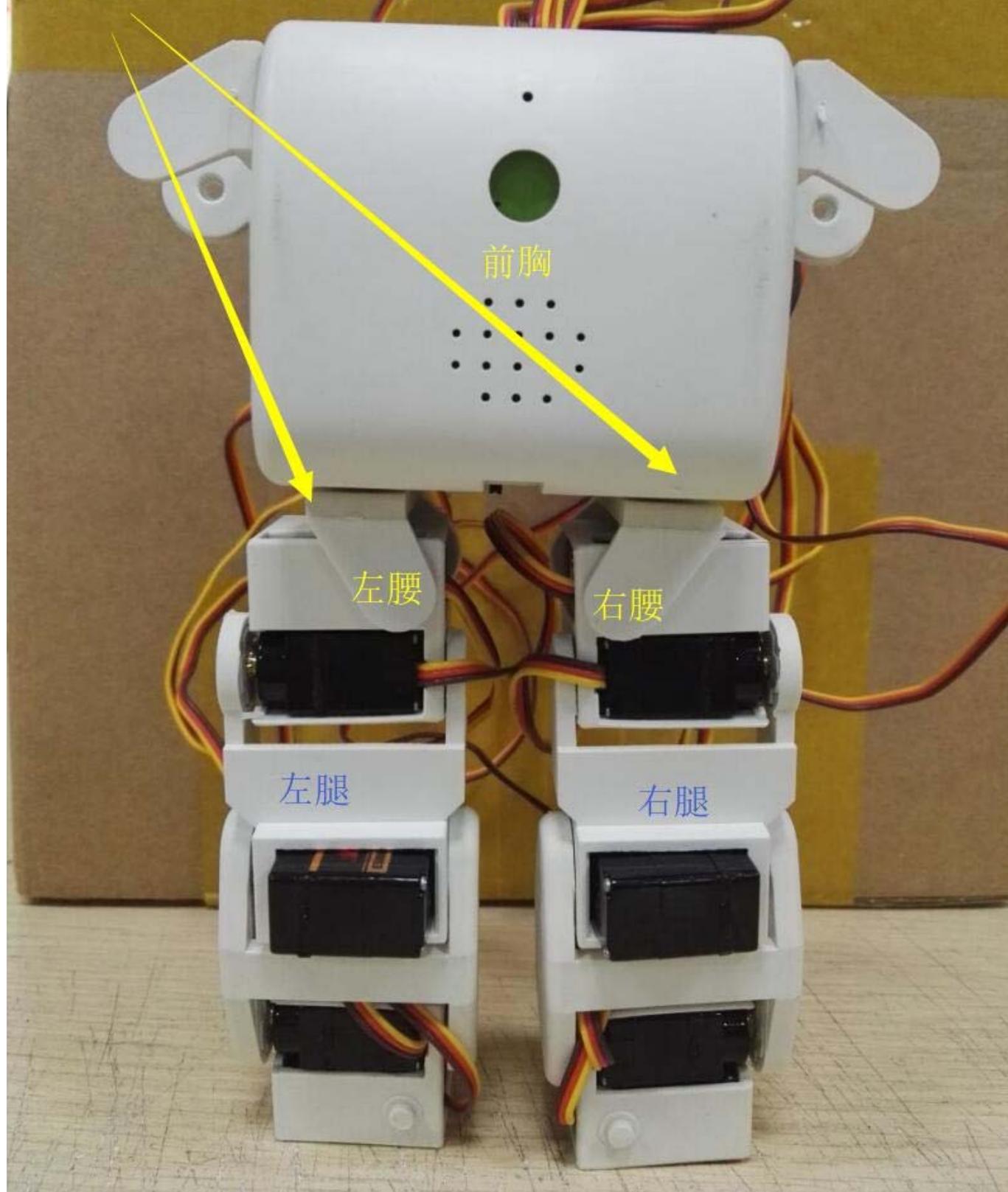
然后按照“舵机装上舵盘、部件串联在一起、**14号舵机所在支架装到中框的左腰上**”的顺序将左腿安装完毕



Doctors of Intelligence & Technology  
严禁复制

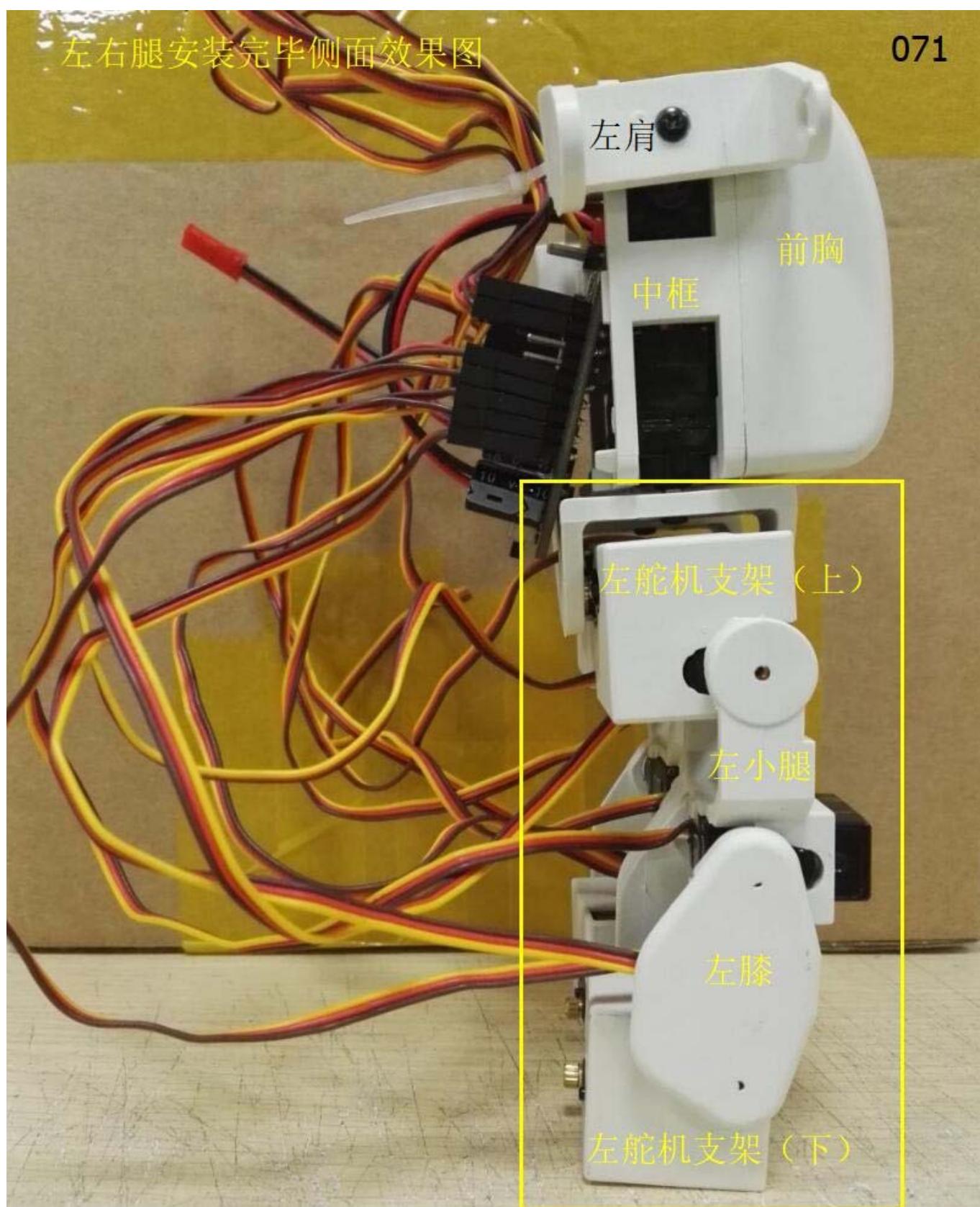
070

左右两腿安装好之后的正面效果图

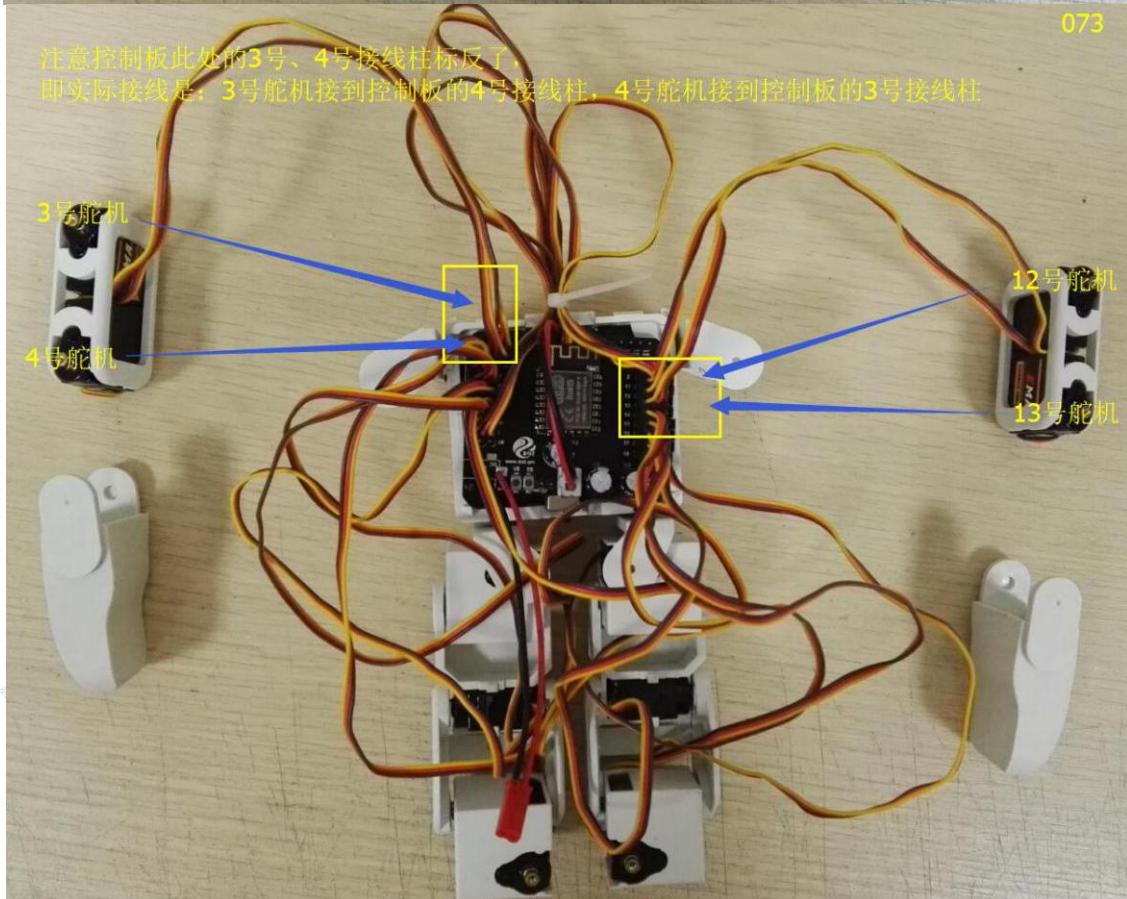
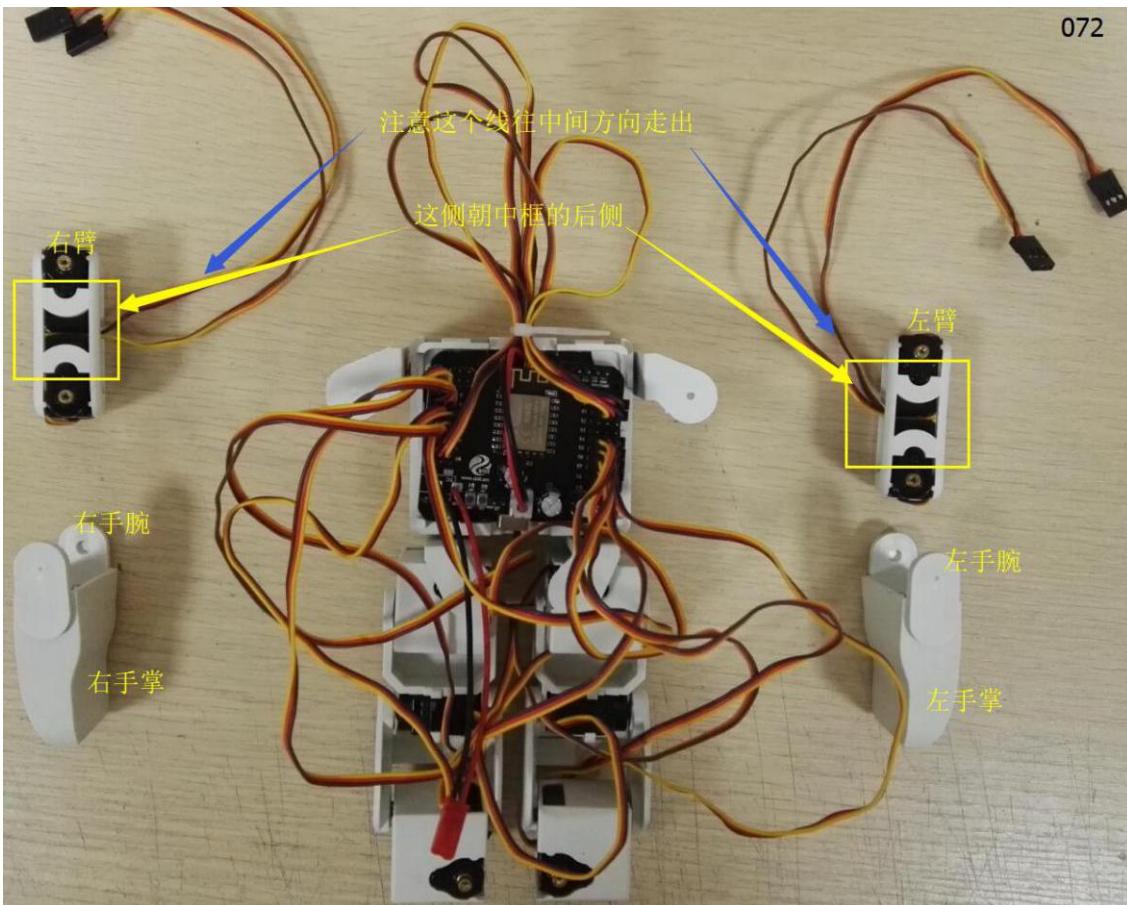


左右腿安装完毕侧面效果图

071

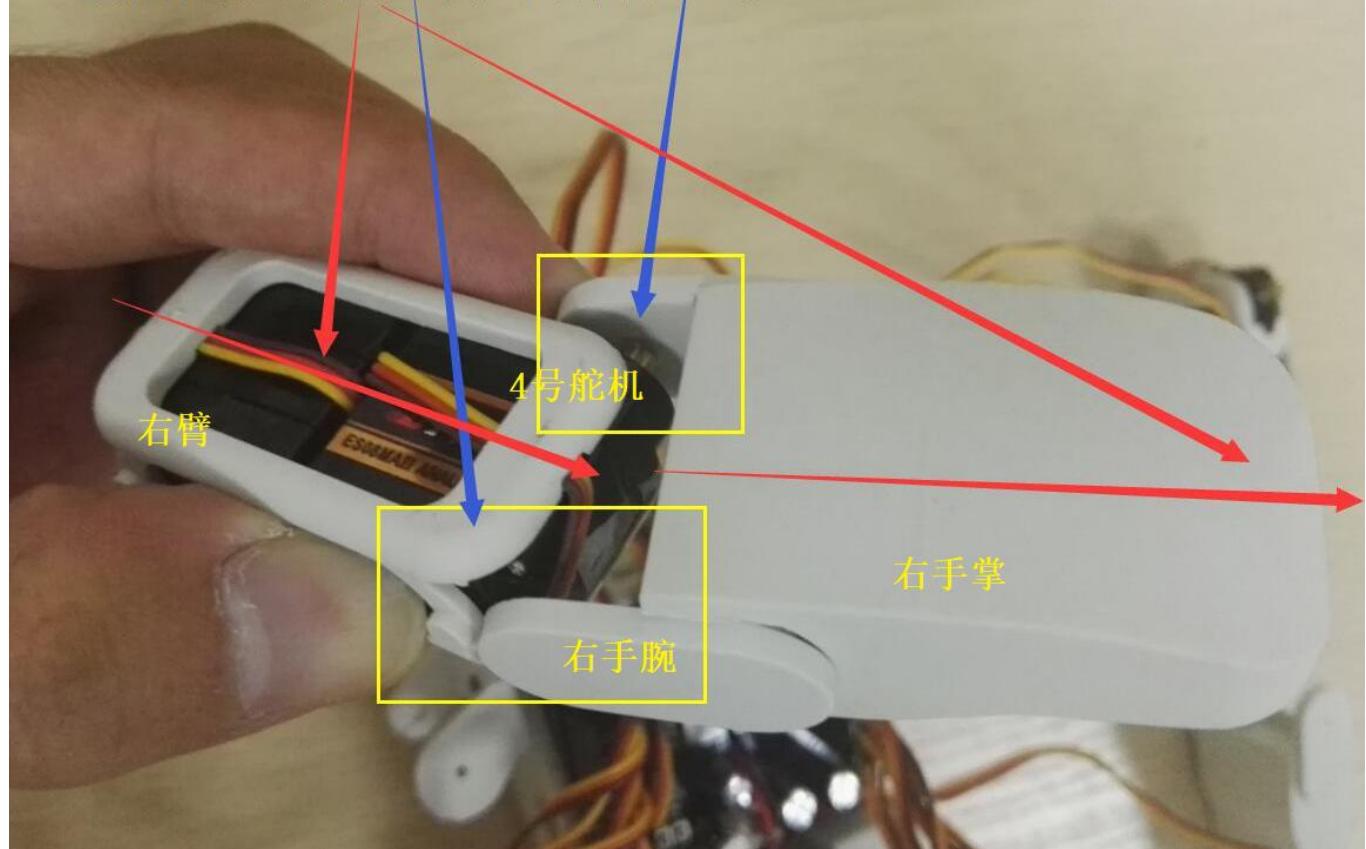


#### d. power



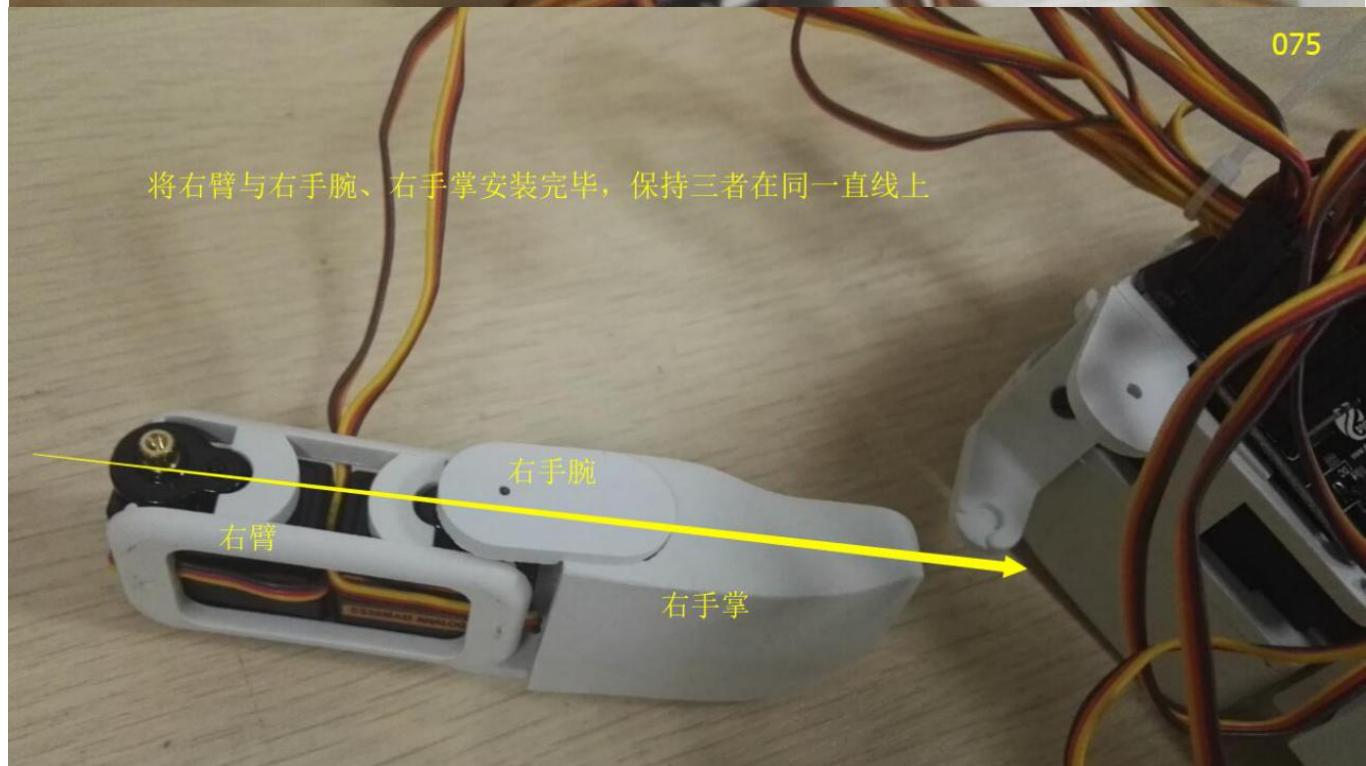
074

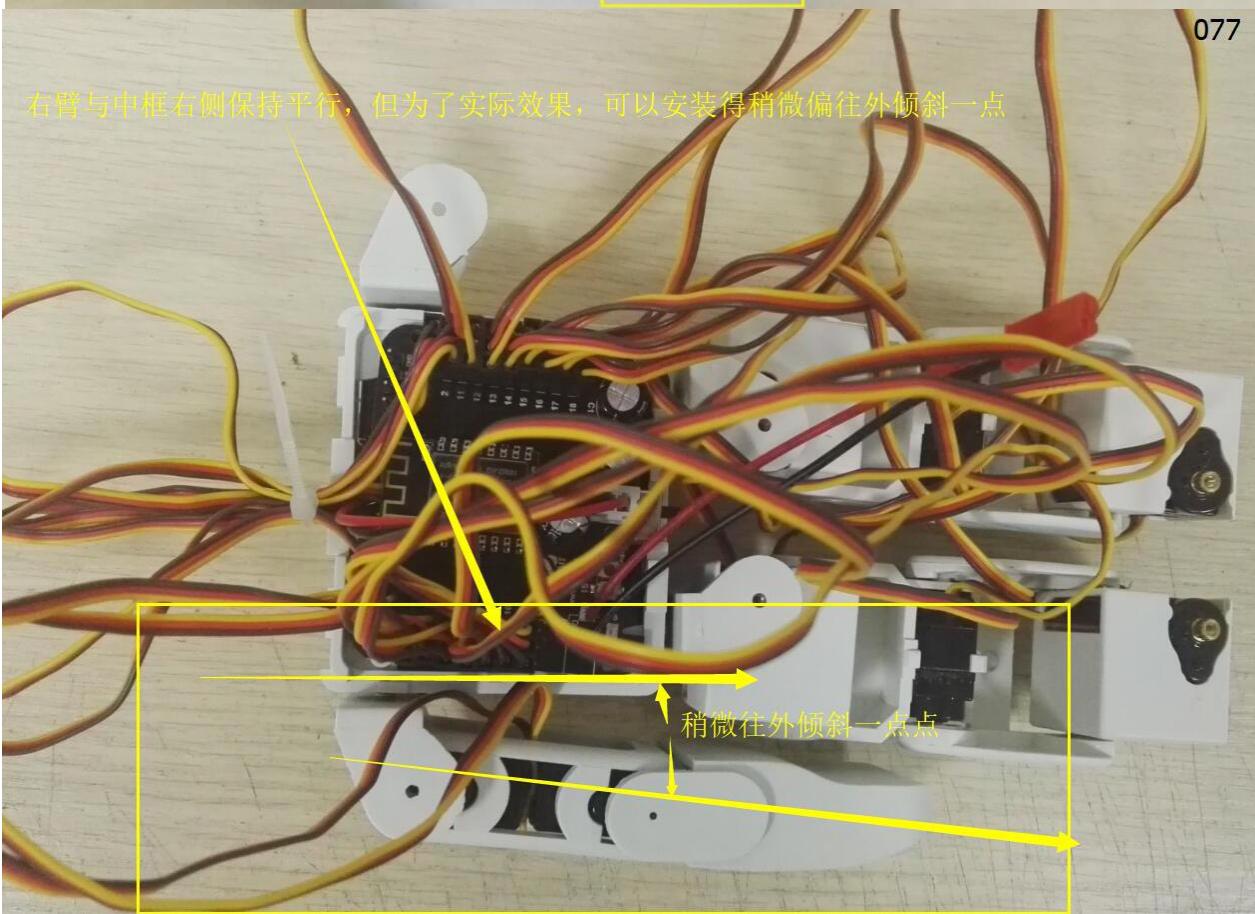
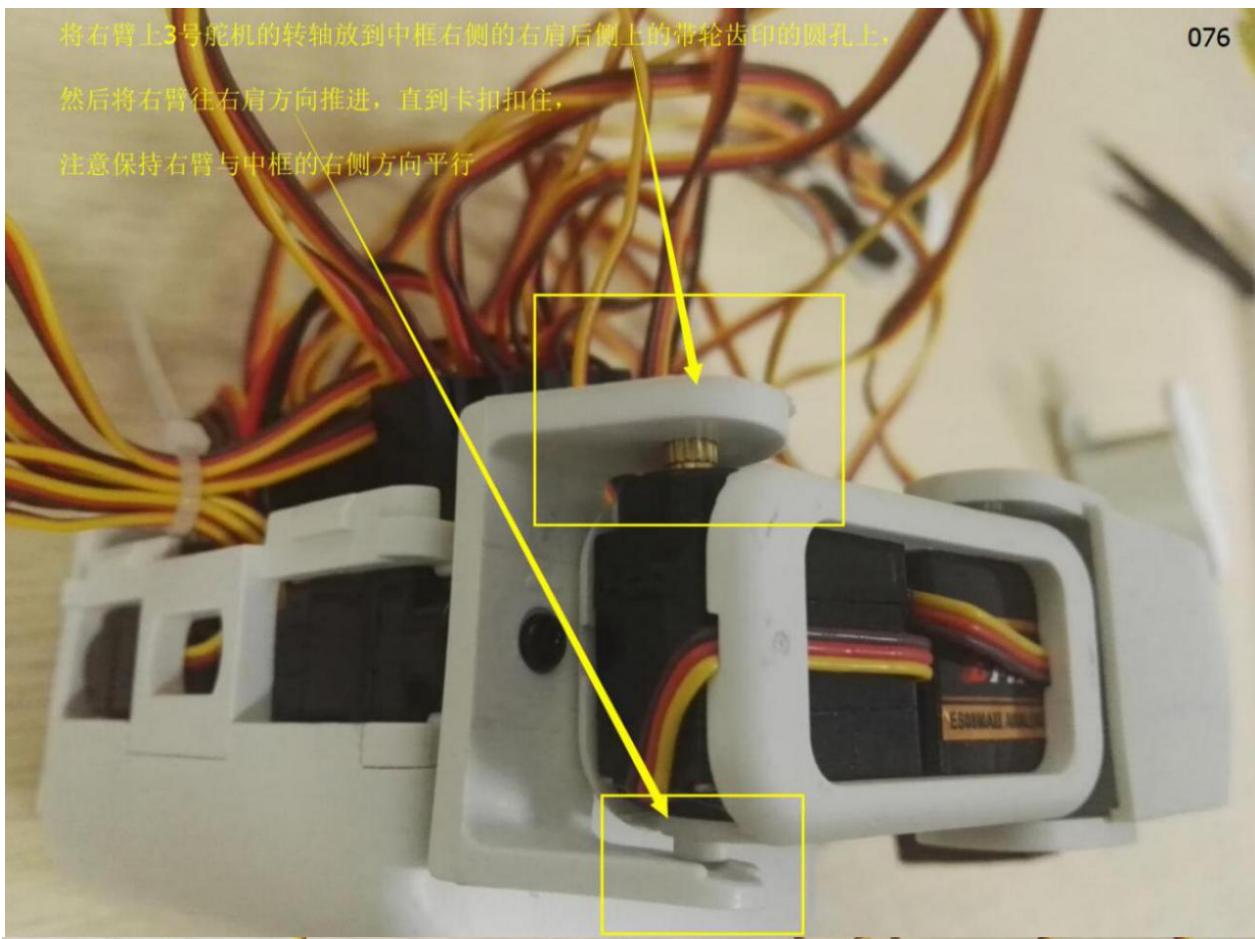
右手腕上带轮齿印的圆孔一侧扣住右臂的**4号舵机转轴**，  
然后右手腕的另一边往**4号舵机方向推**，  
注意保持右臂与右手腕、右手掌**3者在同一直线上**

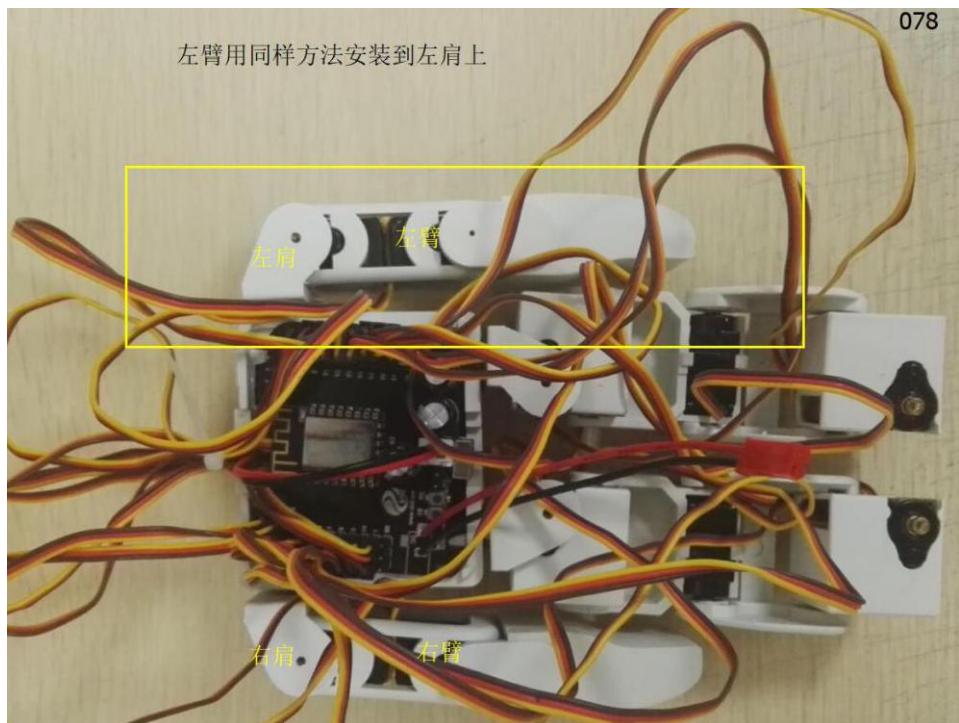


075

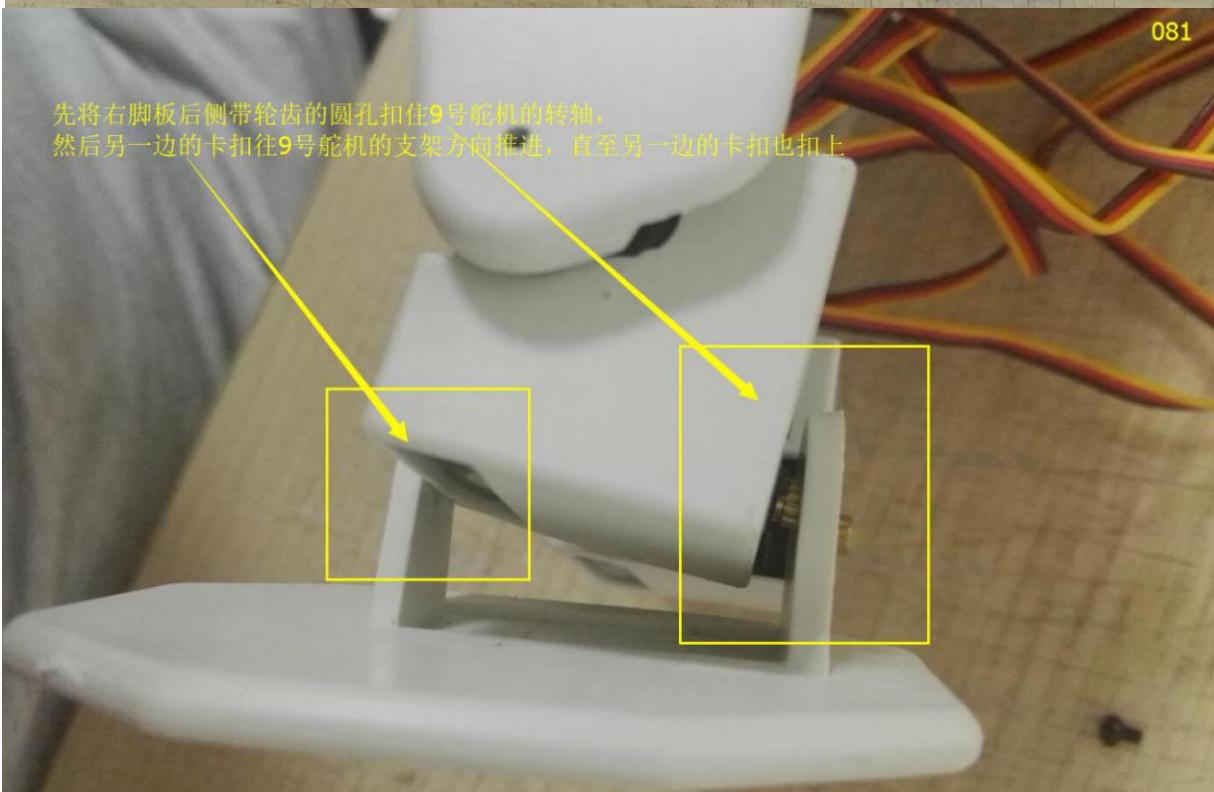
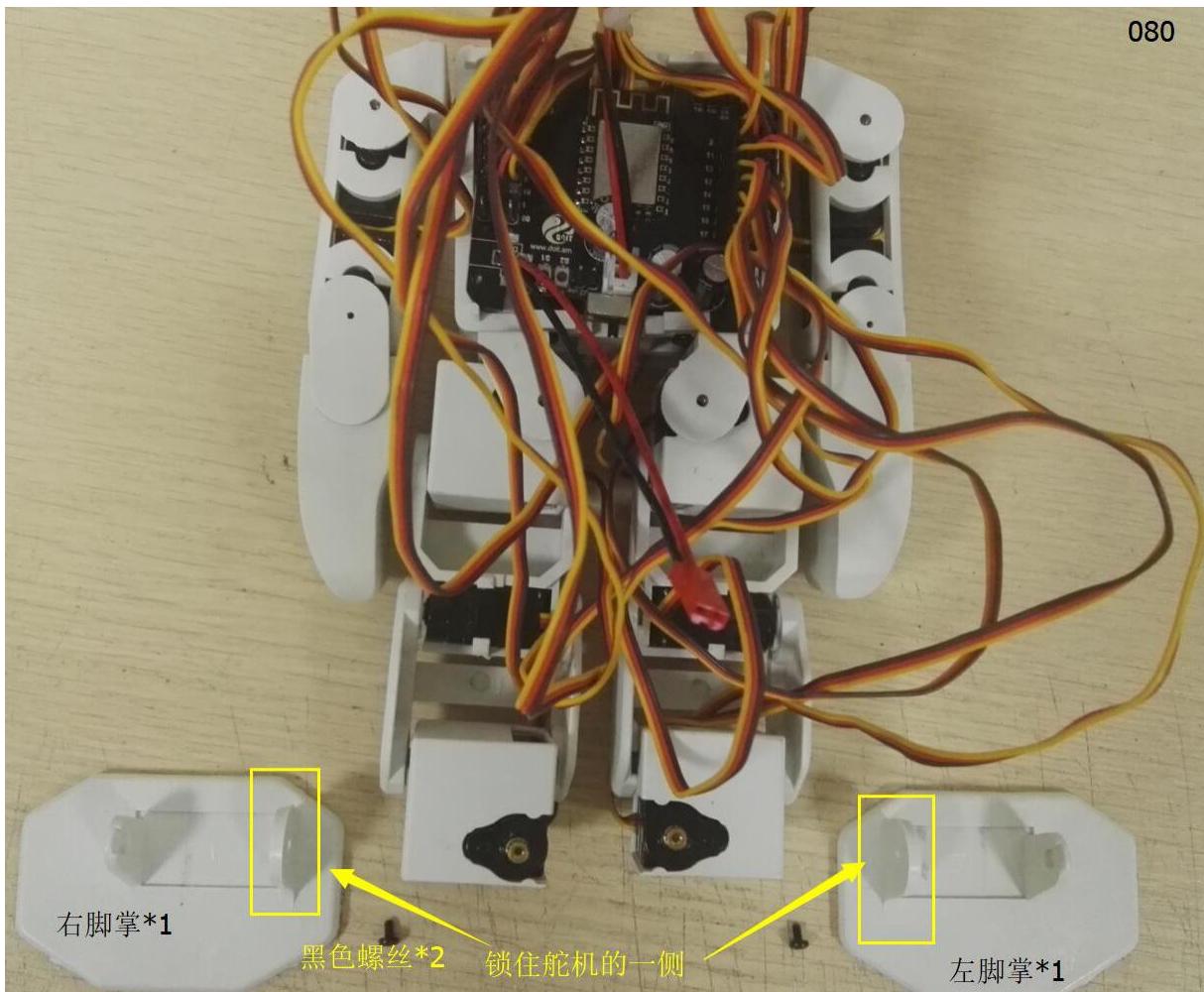
将右臂与右手腕、右手掌安装完毕，保持三者在同一直线上





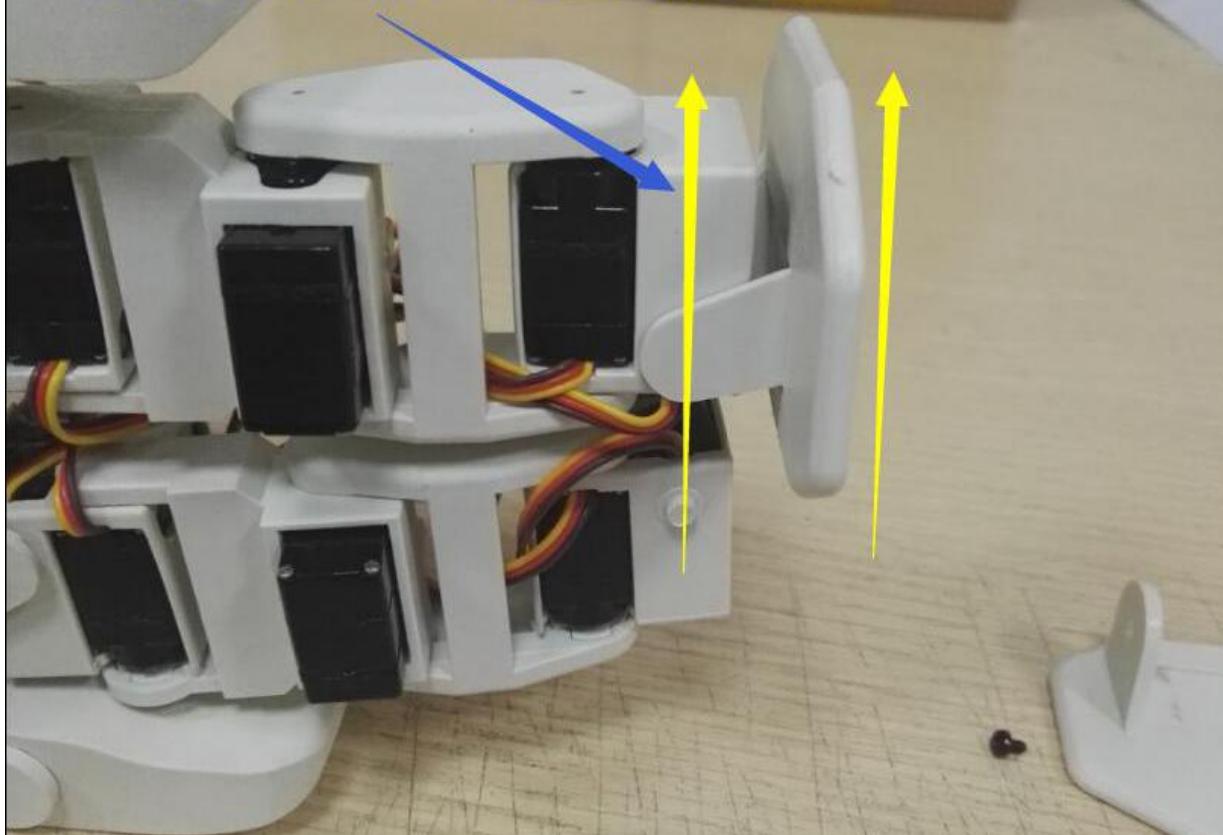


### e. arm and legs



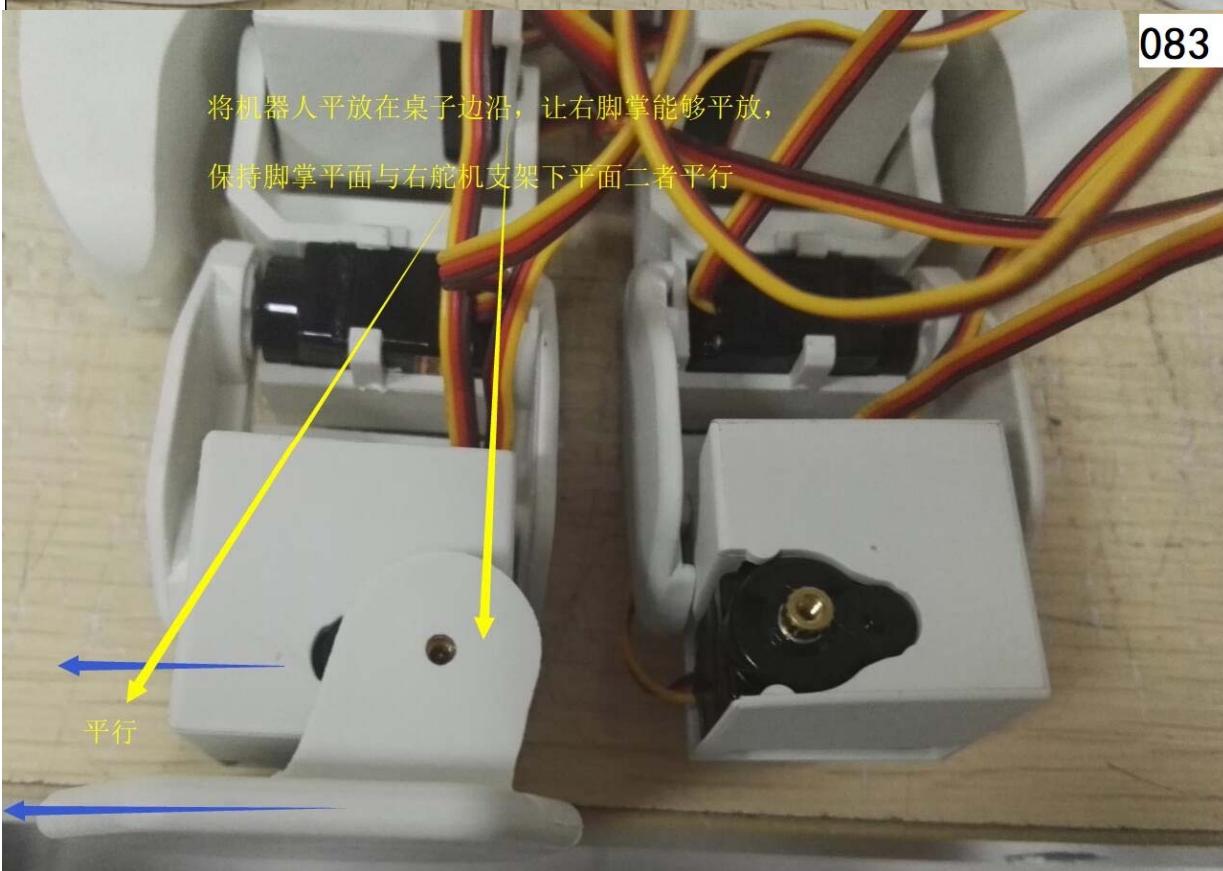
082

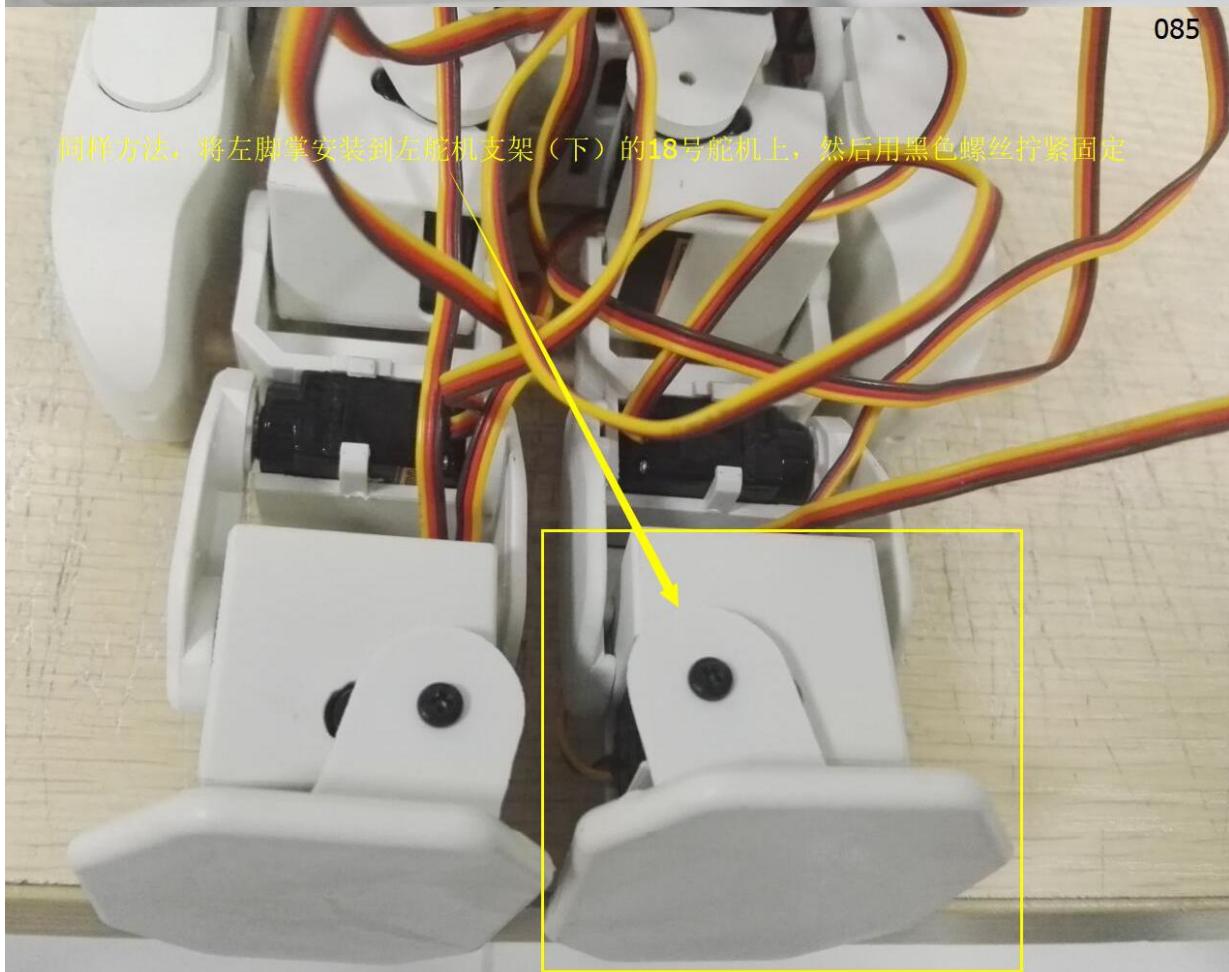
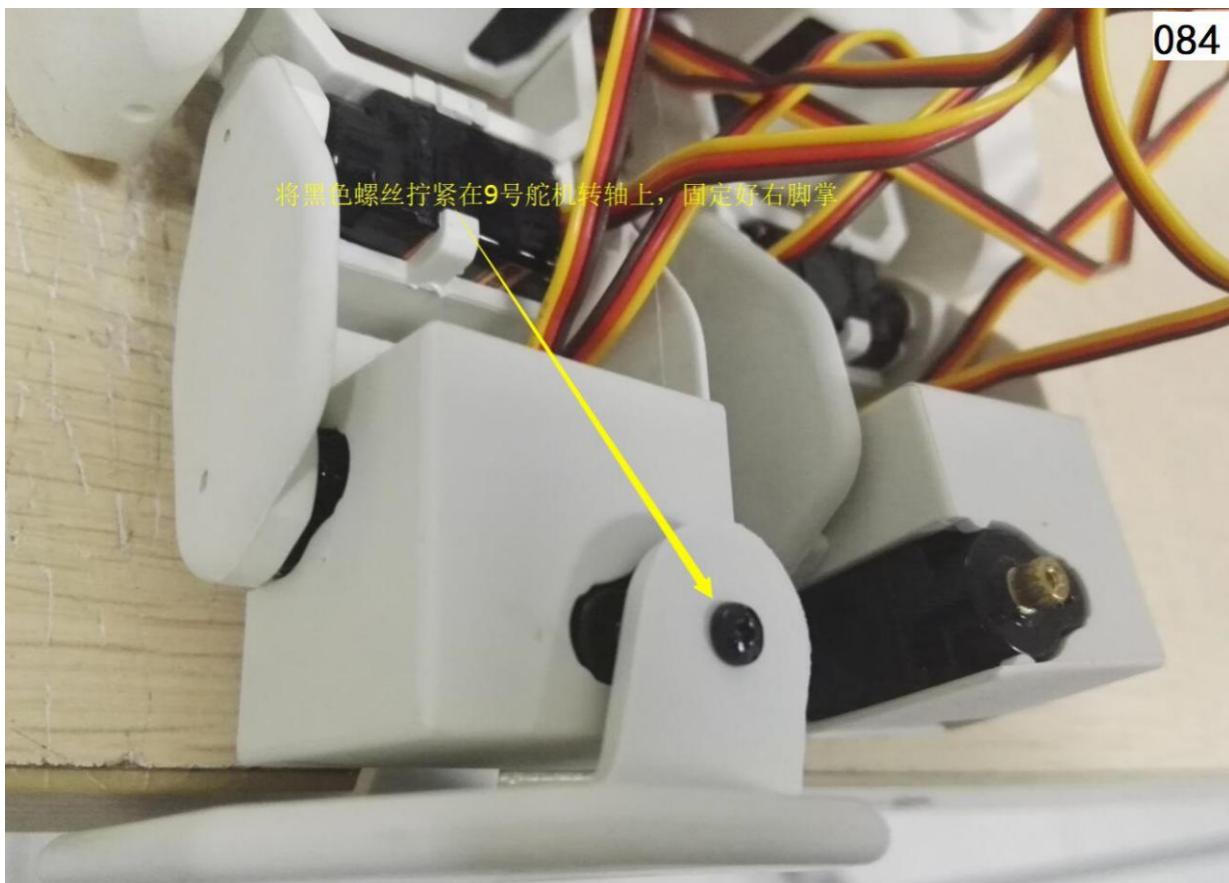
如图，将右脚掌扣上9号舵机所在支架后，  
调整脚掌平面与舵机支架平面保持平行



083

将机器人平放在桌子边沿，让右脚掌能够平放，  
保持脚掌平面与右舵机支架下平面二者平行



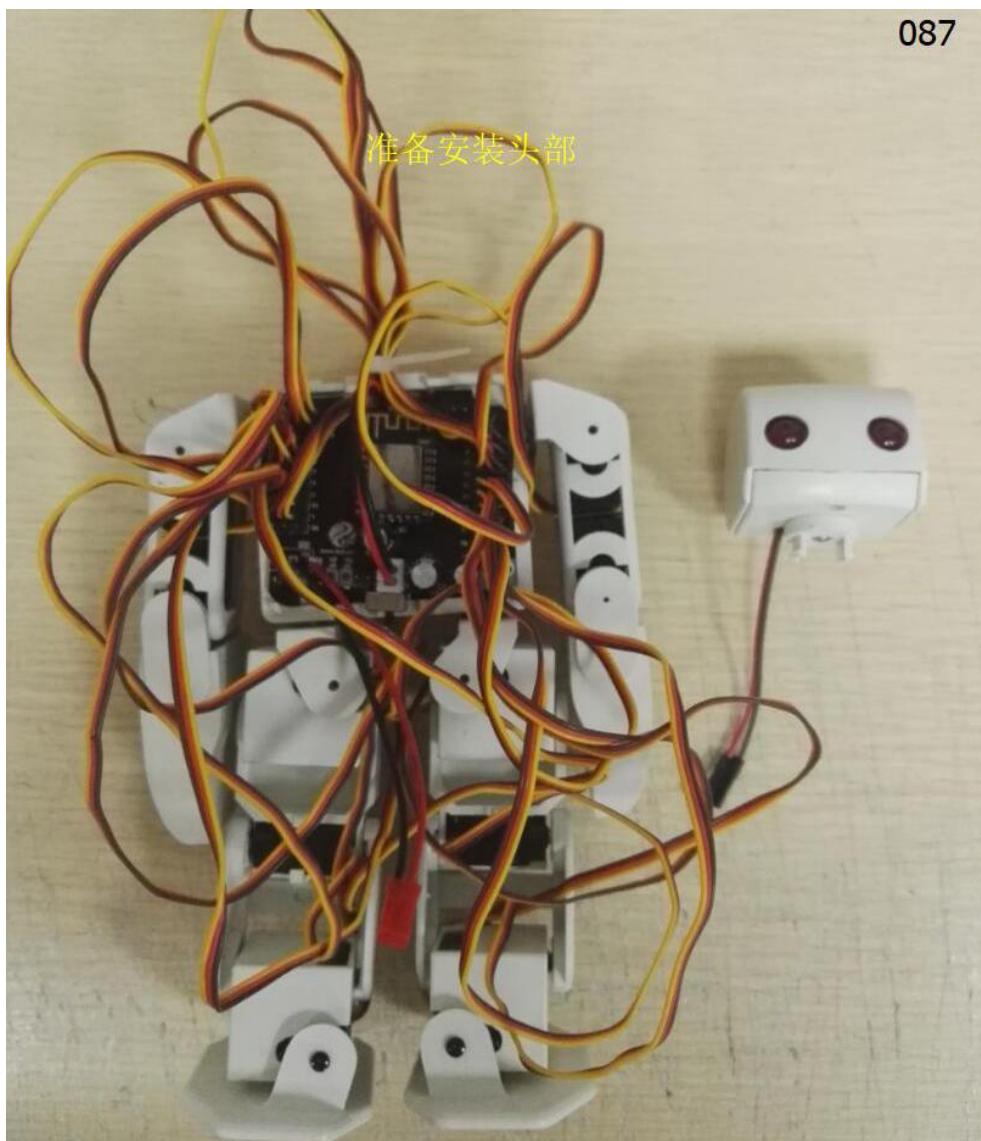


086

左右脚掌安装完毕后的侧面效果图



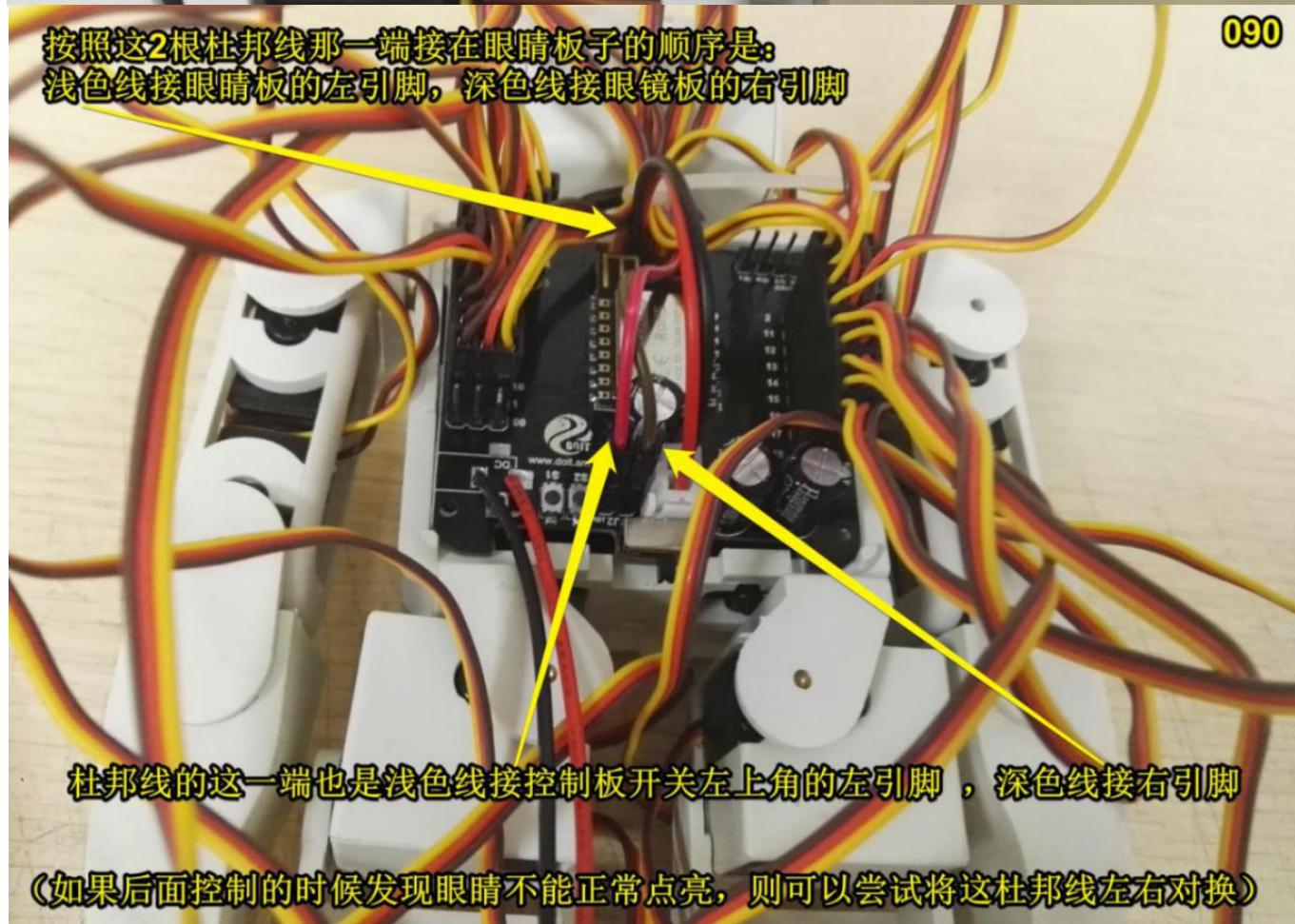
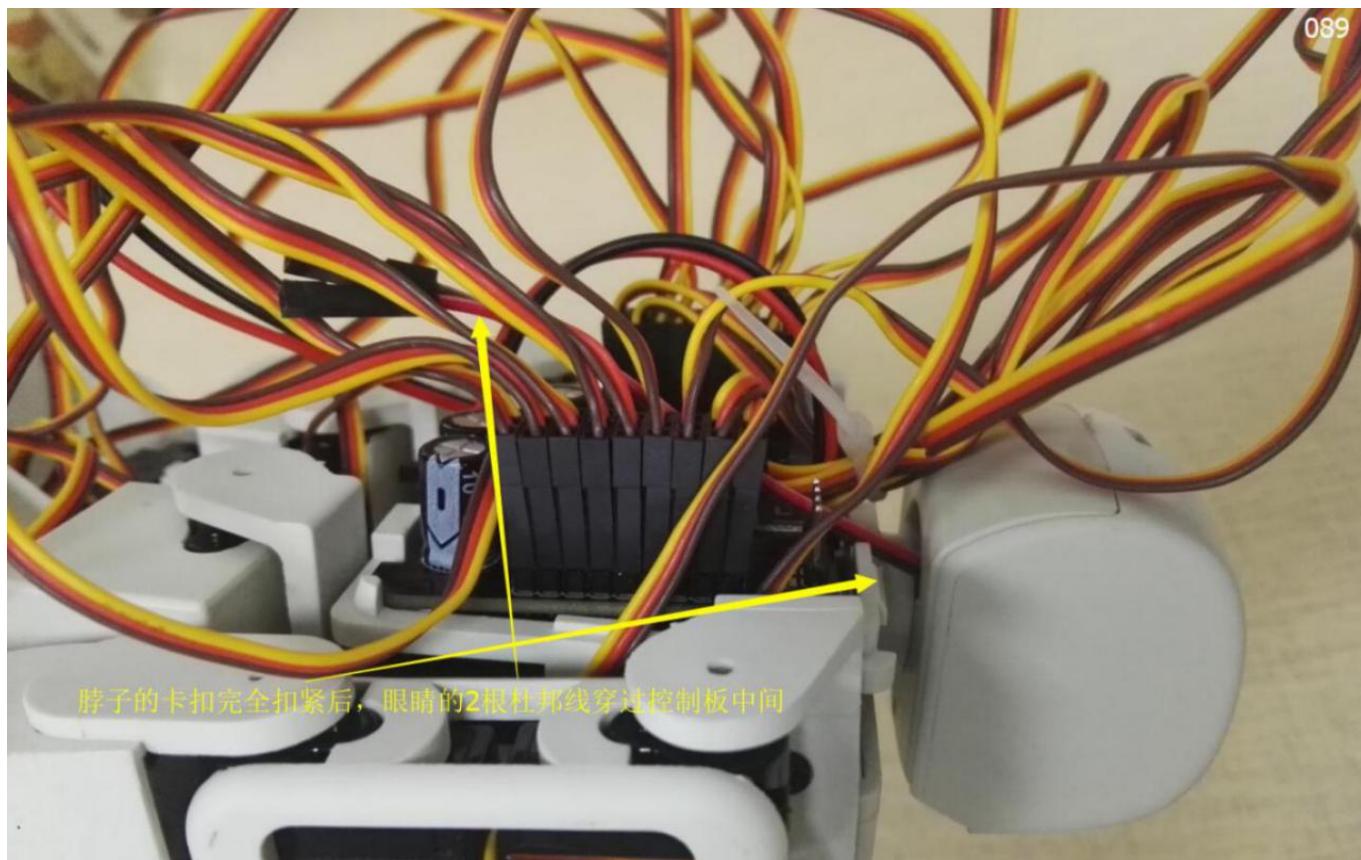
## f. head



087



088



091

头部安装完毕后的正面效果图



Doctor

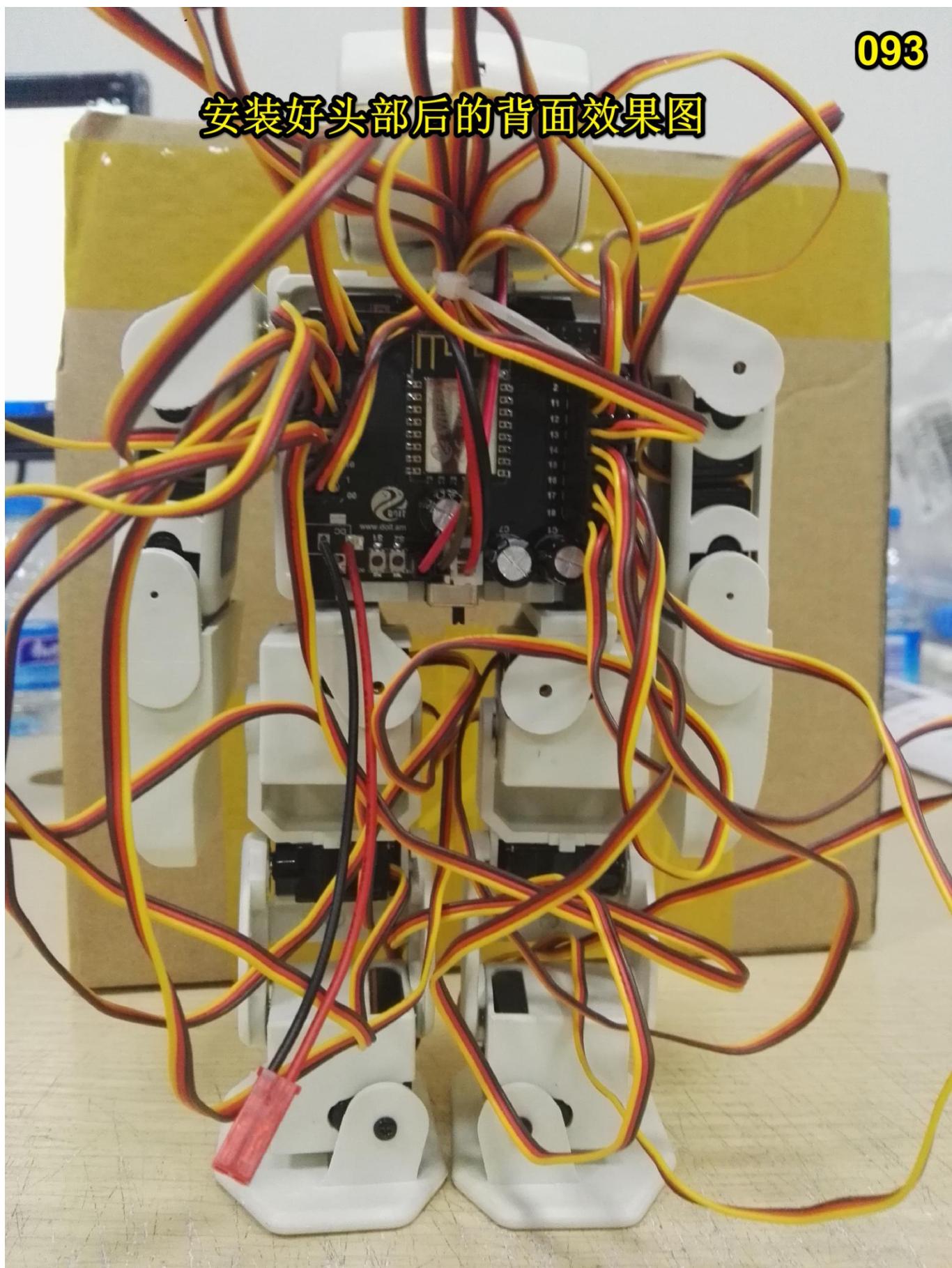
安装好头部后的侧面效果图

092



093

安装好头部后的背面效果图



## g. APP debug

A: During the installation of vivi robot, the installation suggestion has the following two reminders.

### 1) Coarse debugging

Based on the above installation, we have this coarse debugging. In this step, **the key is that the control board must be on power during the whole installation**, till the end. It aims to let the servo at the initial state set by the program built-in the control board. So, after installation, the robot would be at the initial state set by the robot.

### 2) subtle debugging

After the step 1, in order to let the robot finish some operations, we must do some subtle debugging by the following effects.

- a) the two toes of the robot are on one line;
- b) the two heels of the robot are on one line;
- c) two footpads of the robot are on a plane;
- d) the standing posture of the robot should be like a trained soldier, which is vertical and horizontal.

B: a few points before fine tuning:

1. The concept of return: it is the position that the robot should have in maintaining horizontal and vertical stability, as well as the initial position;  
 2, how to debug a steering gear (joint) : click on the corresponding digital, draw hook said selected, then drag the slider "" joint position, adjust the position of the steering gear significantly, click on the lower left corner of the" plus/minus buttons to adjust the steering gear, steering gear for small amplitude finally remember every adjustment after completion of a steering gear have to click on the "back" button to save the initial state;

The number in the figure represents the number of the joint (steering gear).

4. The best state is when the state is fine: like a trained soldier, two toes on a straight line; 2 feet on a horizontal plane, 2 heels in a straight line; Head up, chest out, etc.

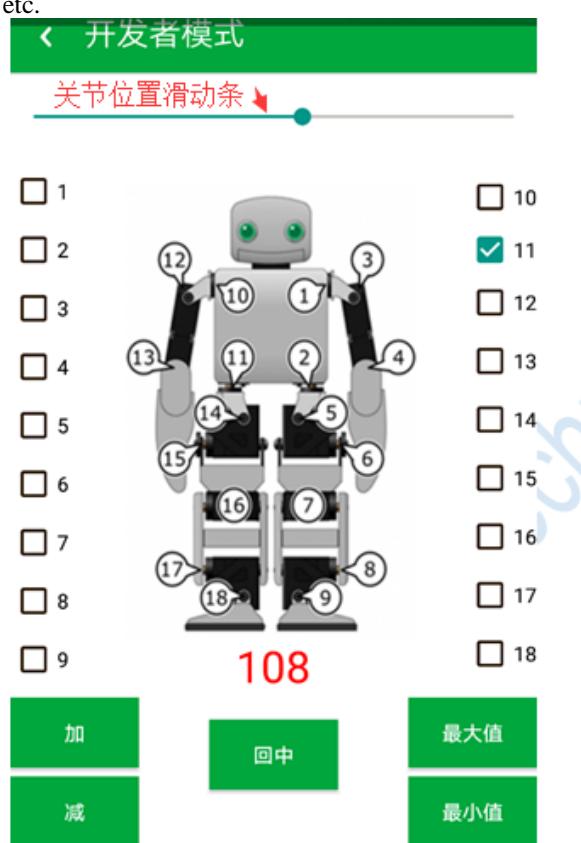


figure 4.3.g

C: debugging experience on "developer mode" :

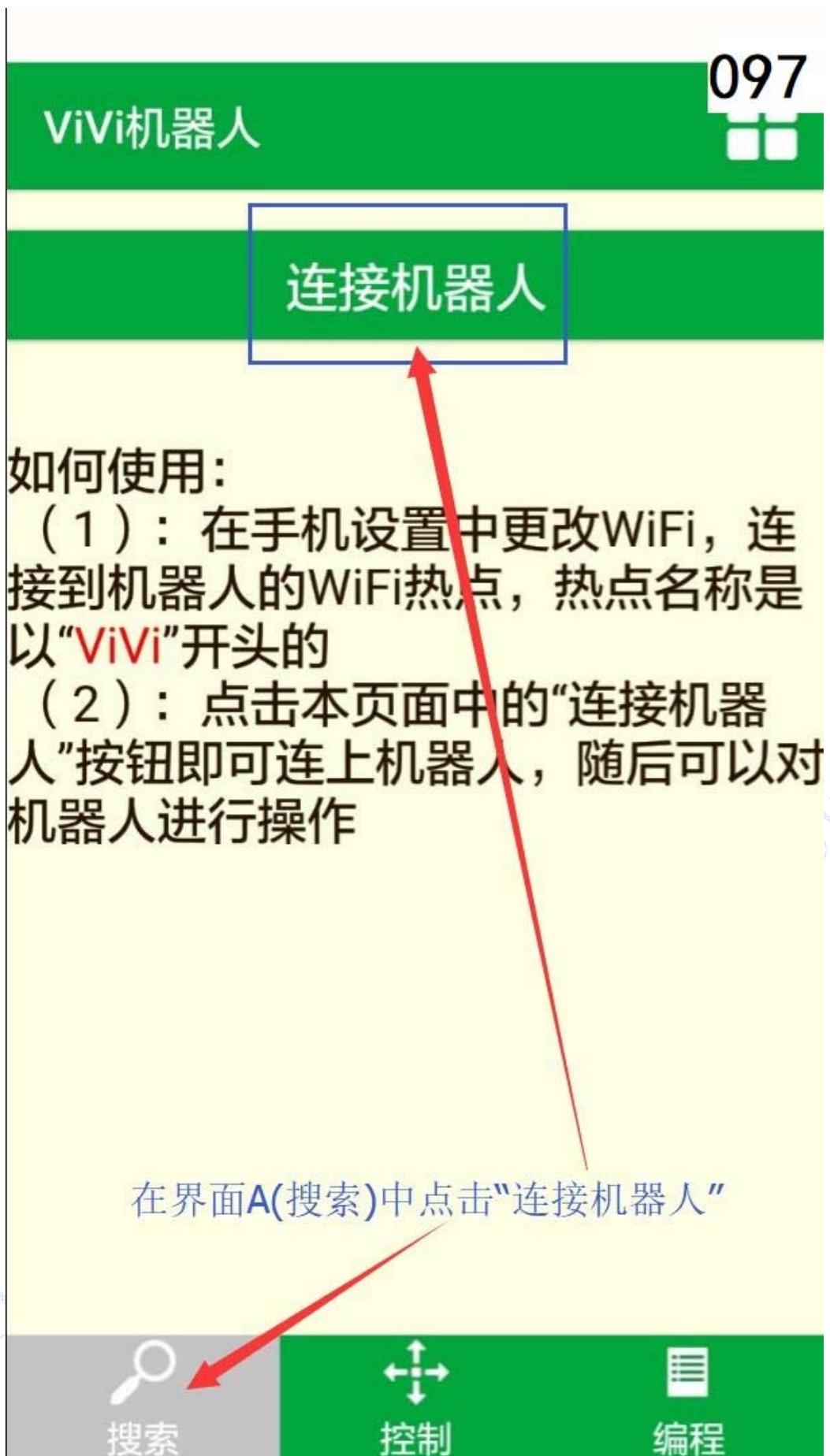
- 1, enter debug interface after adjust the position of the robot according to the corresponding steering gear number keep robot standing posture as shown in figure 4.3. Shown in g, such as the robot's two toe is not on a level, the adjustment of steering gear (joint) and 9, 18 makes two toes on a straight line, after the adjustment, click the "back" to save the current position as a standard robot's initial position.
  2. After adjusting the position of each joint, you need to click back to the middle button to save.
  3. After fine tuning, return the control sub-menu in APP to make it walk several steps to see if it is stable. If not stable, continue to adjust the initial position. We can adjust the steering gear (joint) 15 and 6 or 17 and 8 with our debugging experience, such as if we are going to fall backwards while walking.
  4. The position of the final adjustment is basically as shown in figure 4.3.
- The following is the specific debugging process:

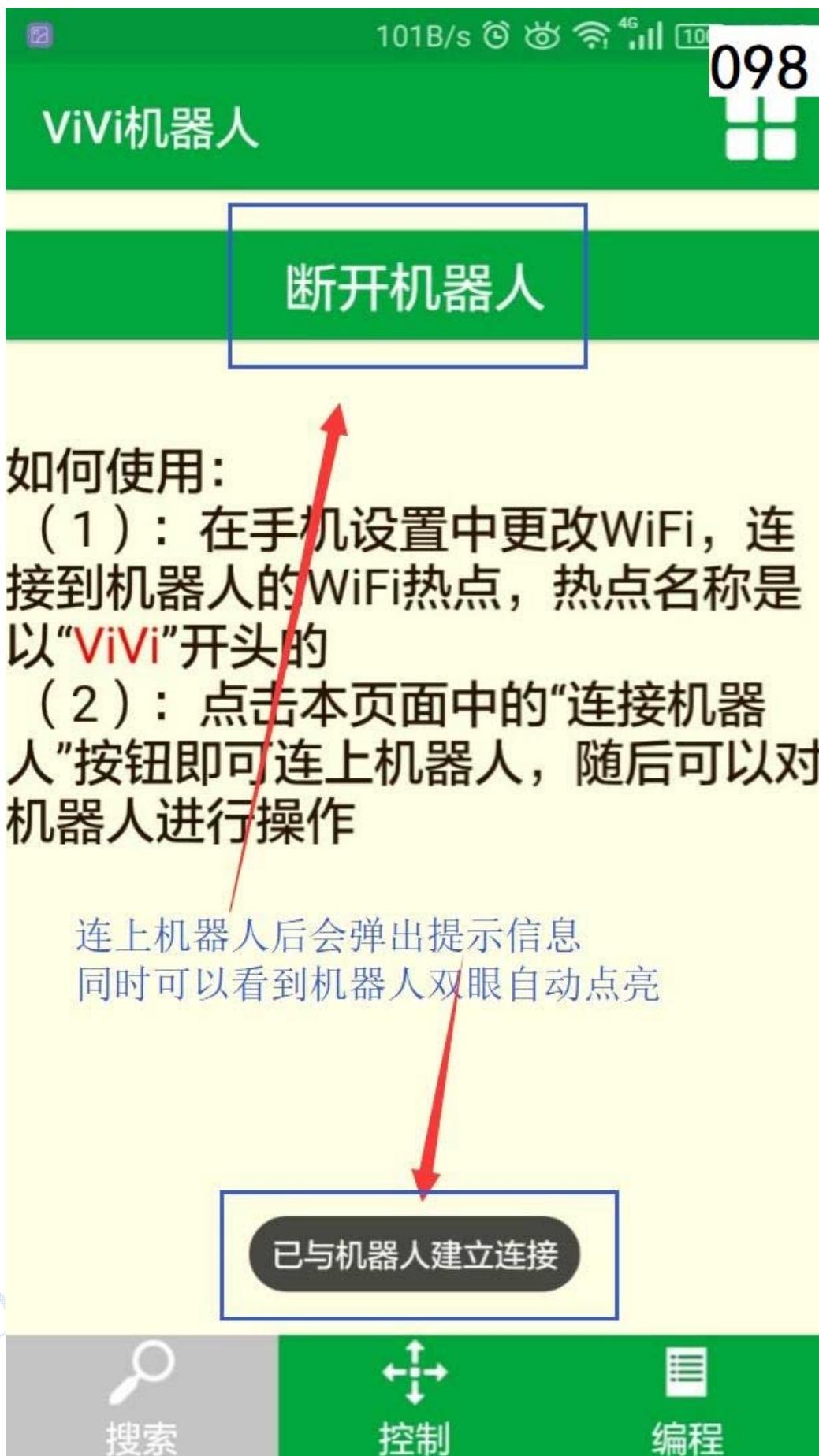
## ①APP usage

First, turn on the power switch of the robot, then turn on the WiFi function of the phone, search for the hot spots around, and then click the following icon to do the operation;









099

## 控制

常规

玩盒子

00 向左

01 向前

02 向右

03 一个下摆

04 鞠躬

05 求婚

06 拥抱

07 鼓掌

08 击掌

## 摇杆

单个动作控制：  
点击界面**B(控制)**，  
可以看到上方的菜单栏显示的是常规动作

搜索

控制

编程

100

## 控制

常规 玩盒子 踢足球

0A 摆盒子 0B 捡起盒子 0C 弯腰捡起

0D 接过盒子 0E 展示盒子 0F 交出盒子

10 扔盒子 11 放开盒子 12 弯腰放下

摇杆

上方的菜单栏往左滑动，可以看到“玩盒子”一类的动作

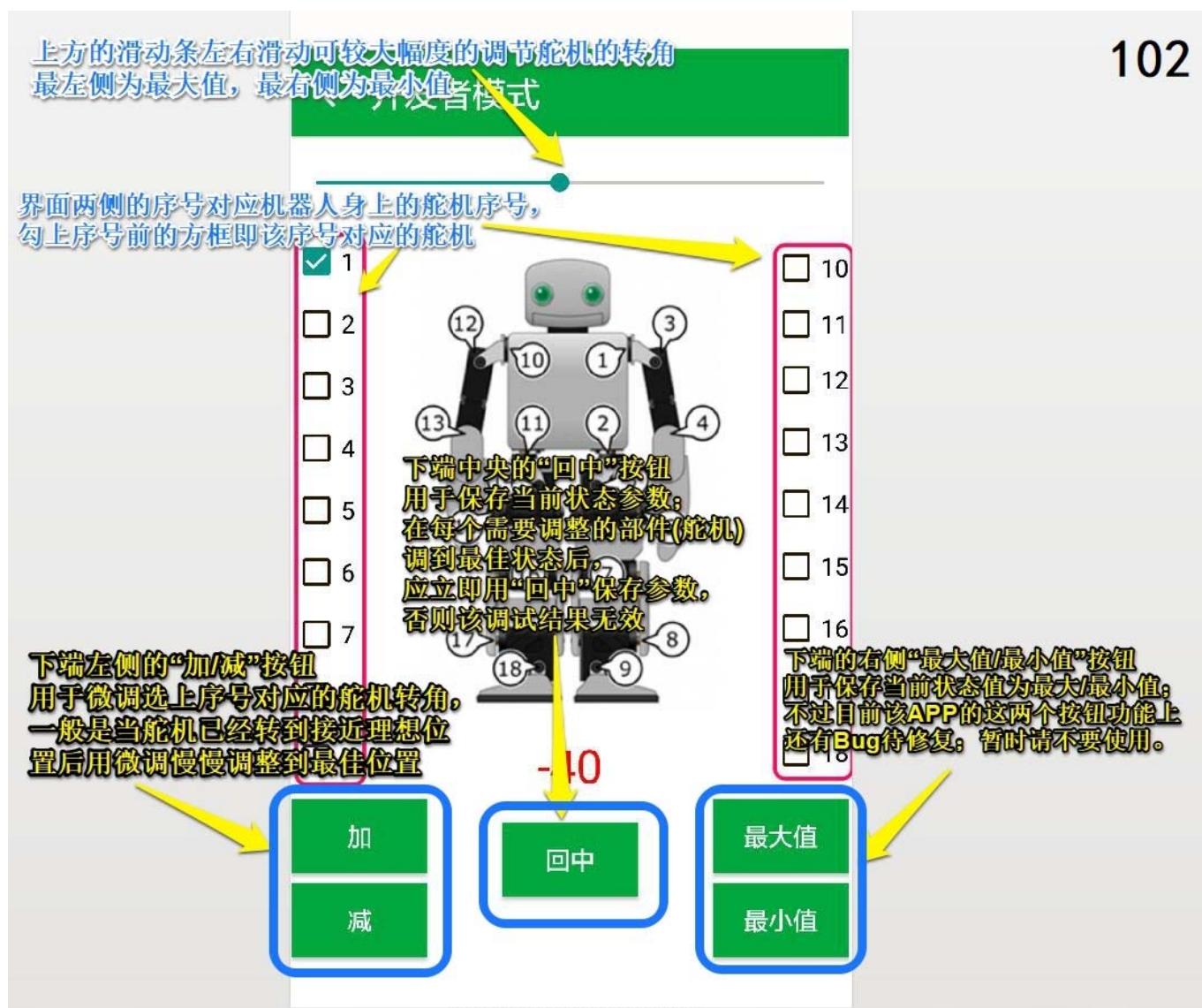
搜索 控制 编程

101

点击界面右上角的“功能按钮”，  
界面的右边将弹出系列衍生功能栏，  
点击第一个“调试”按钮进入“开发者模式”，  
可对机器人进行微调等动作校准



注意：除非机器人确实是无法正常动作，  
否则非开发人员不要点击“调试”按钮进入“开发者模式”，  
不然随意调试很容易导致机器人动作变为异常

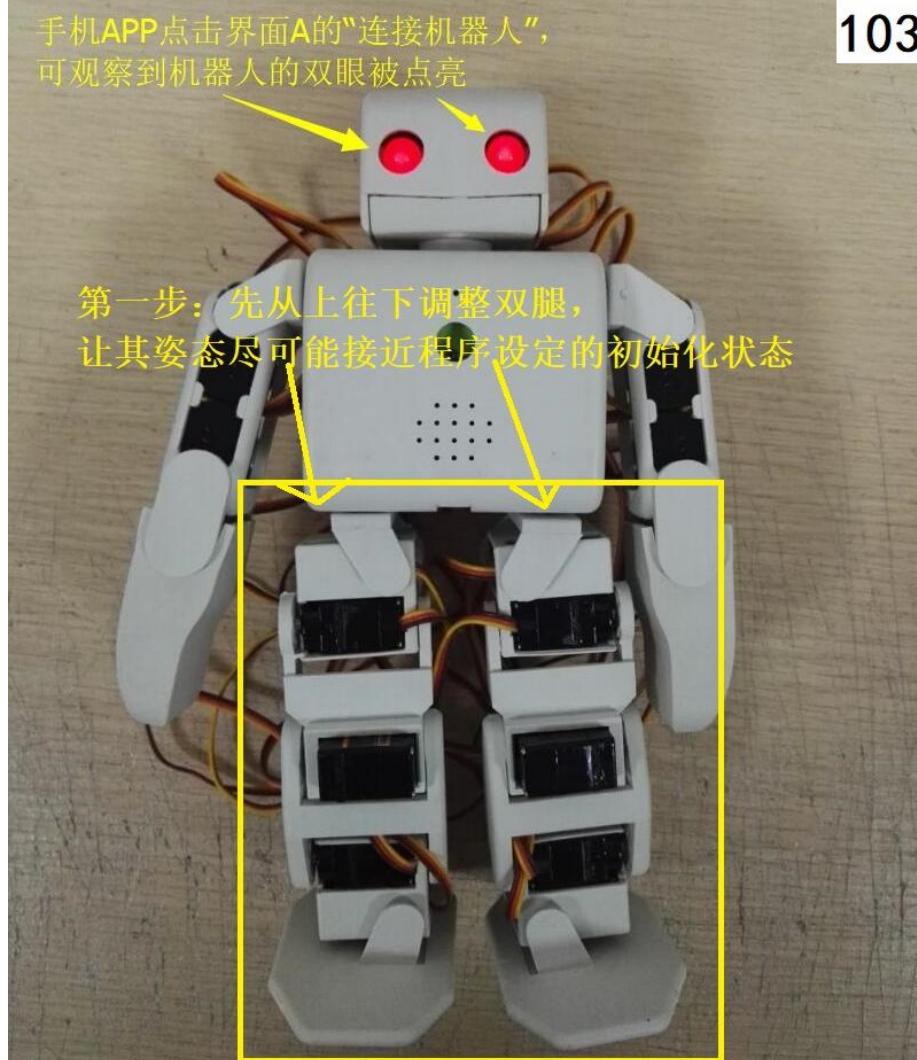


## ② Debug your legs

103

手机APP点击界面A的“连接机器人”，  
可观察到机器人的双眼被点亮

第一步：先从上往下调整双腿，  
让其姿态尽可能接近程序设定的初始化状态

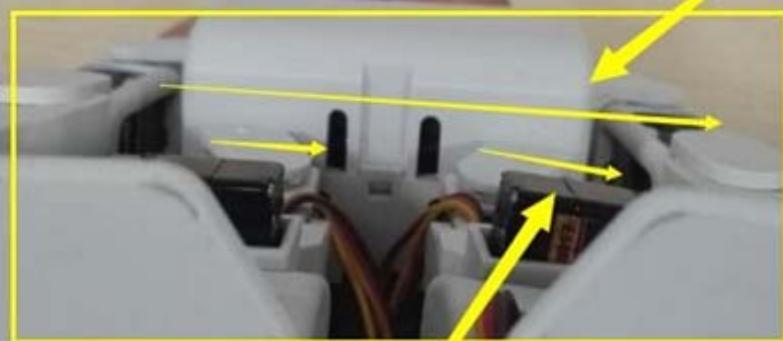


104

**第1步：**

用手握住机器人并将其倒立，观察左右腰与前胸是否平行

view the robot to judge whether the waist is line up with chest

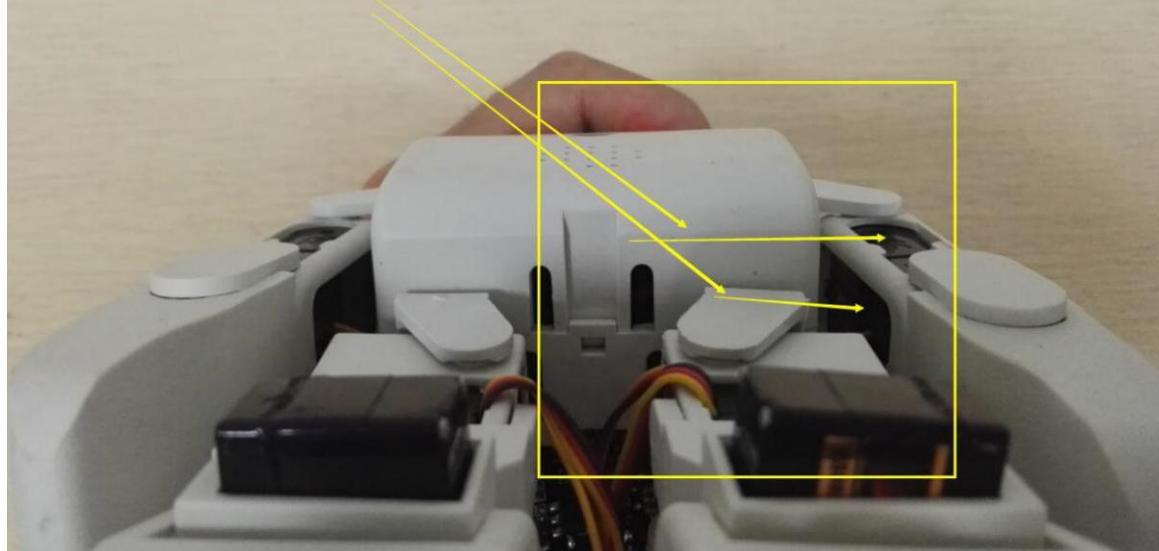


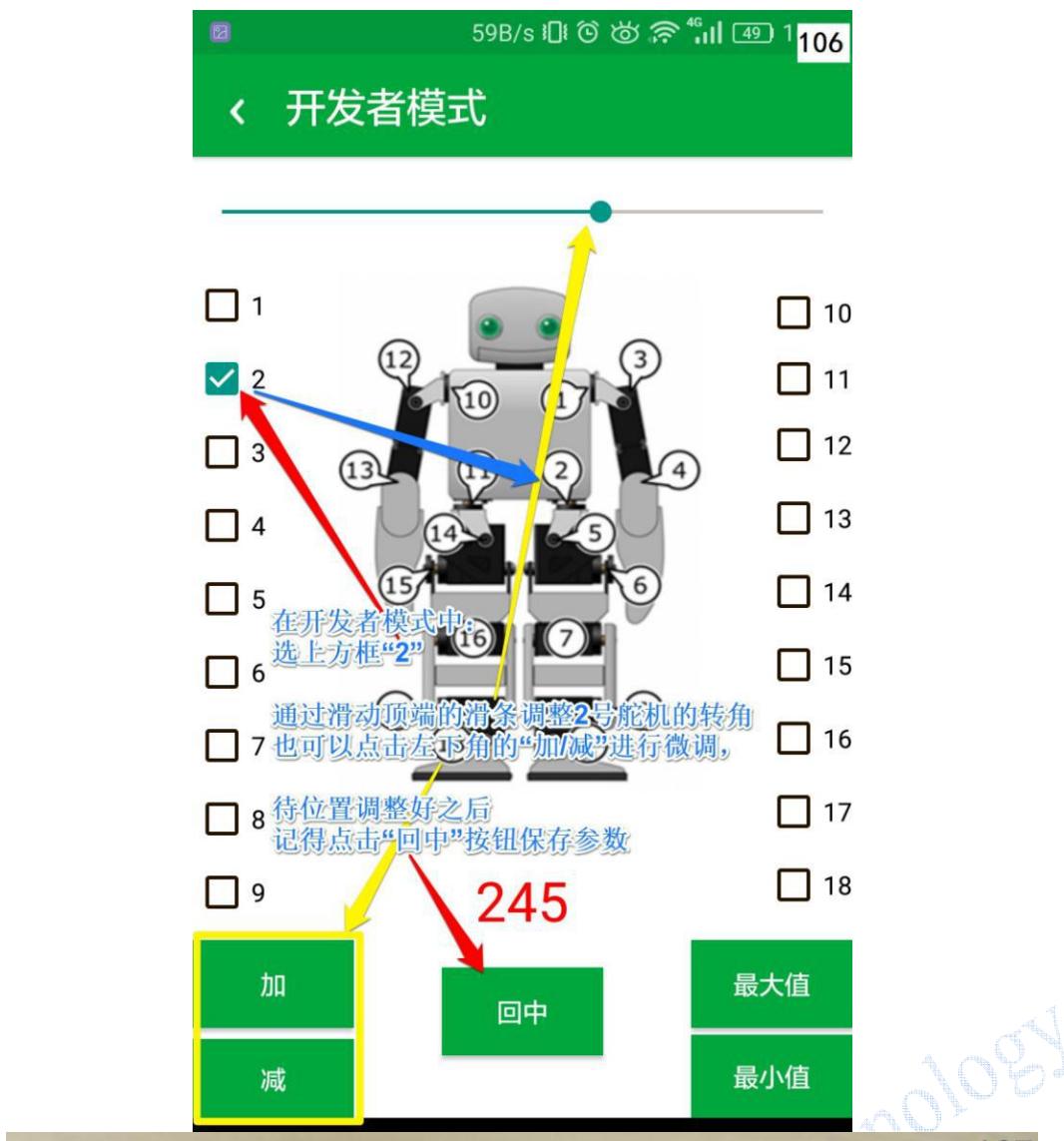
evidently, it is not parallel between them. So, we must click the 2nd servo in APP to fine tune, and let them parallel. after that, click "huizhong" to save the parameters.

在此图可观察到右腰与前胸明显不平行，  
在手机app的“开发者模式”中点击2号进行微调，  
直至二者平行了点击“回中”保存参数

105

右腰与前胸明显不平行

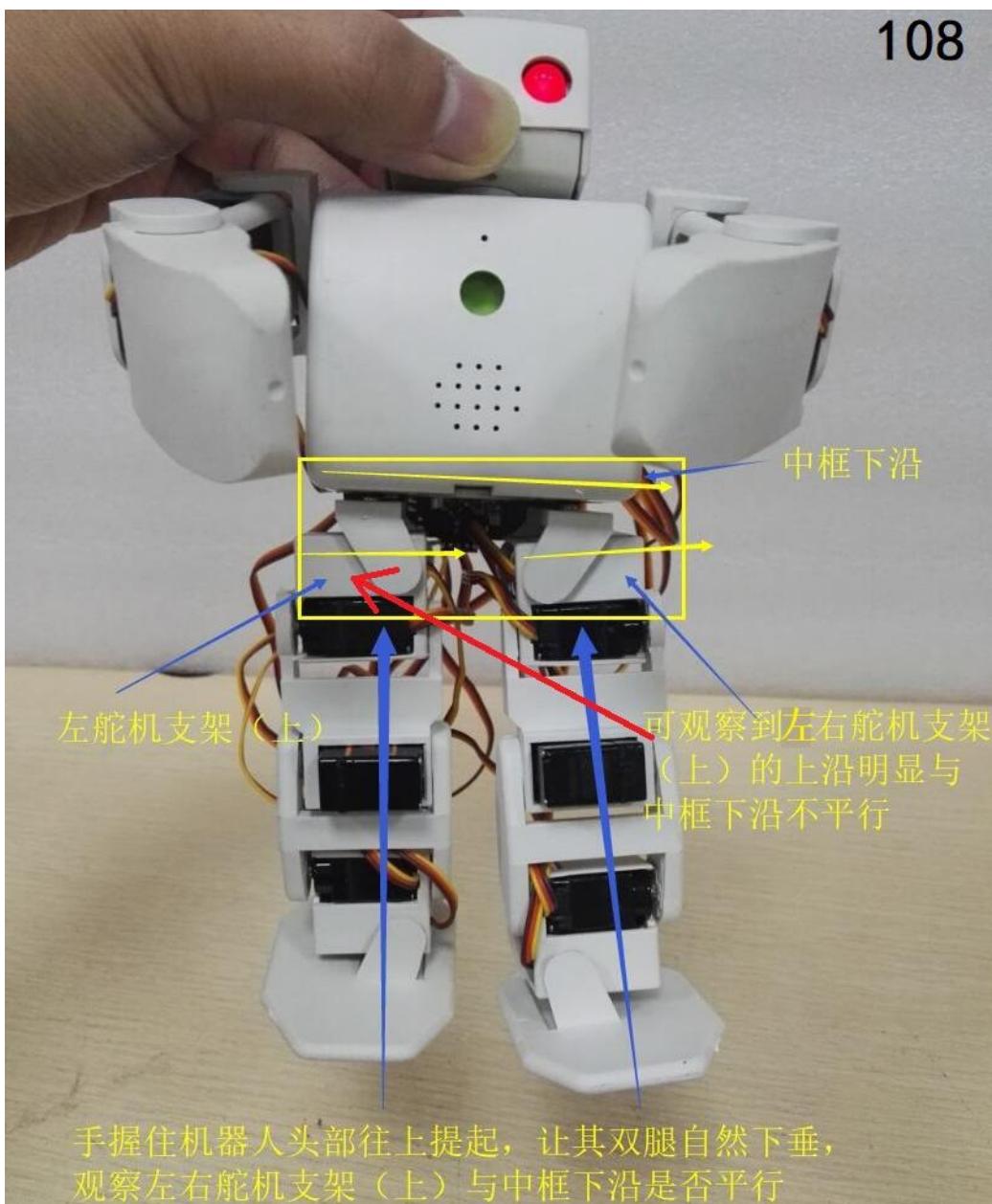




107



108

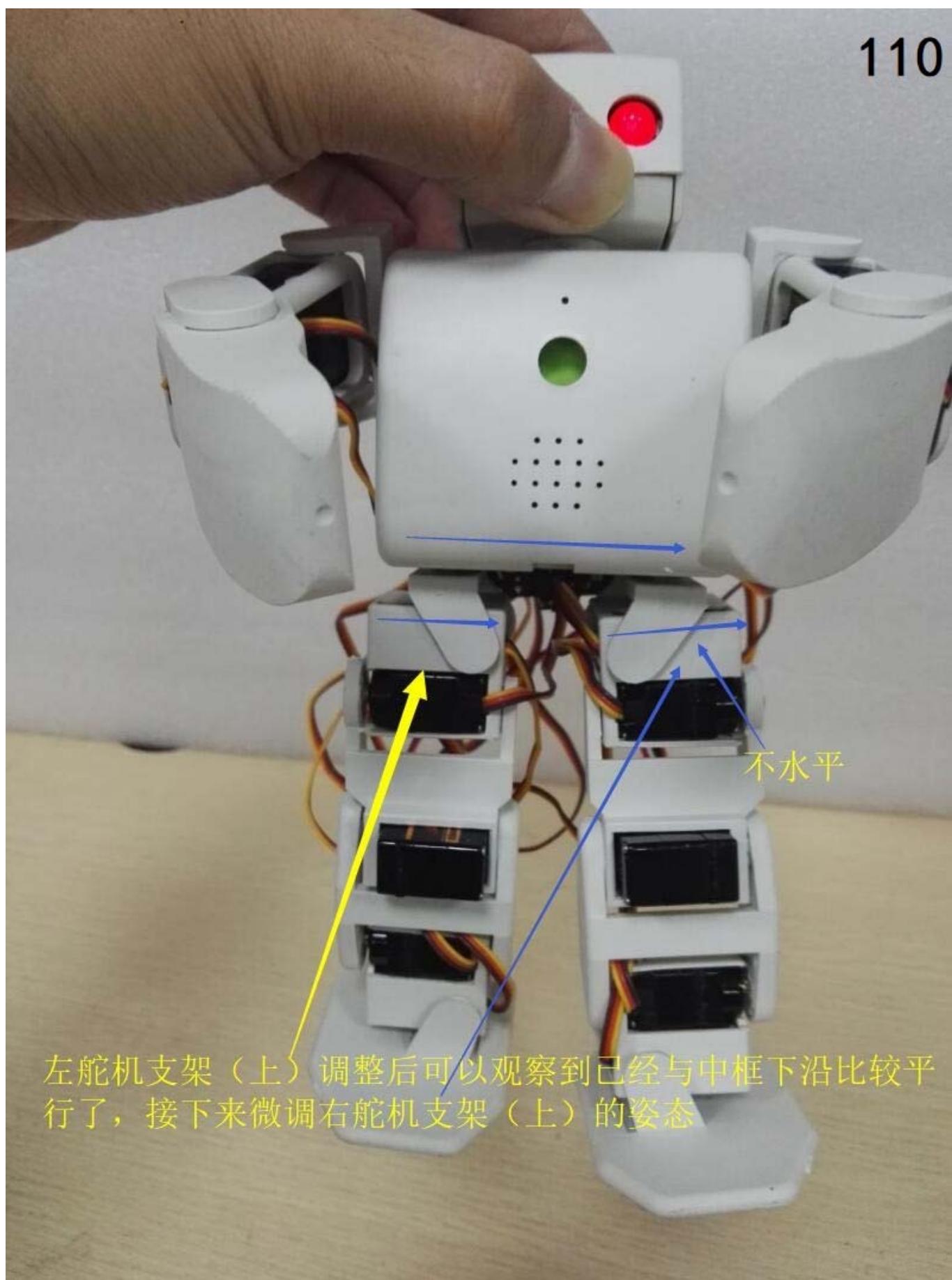


109

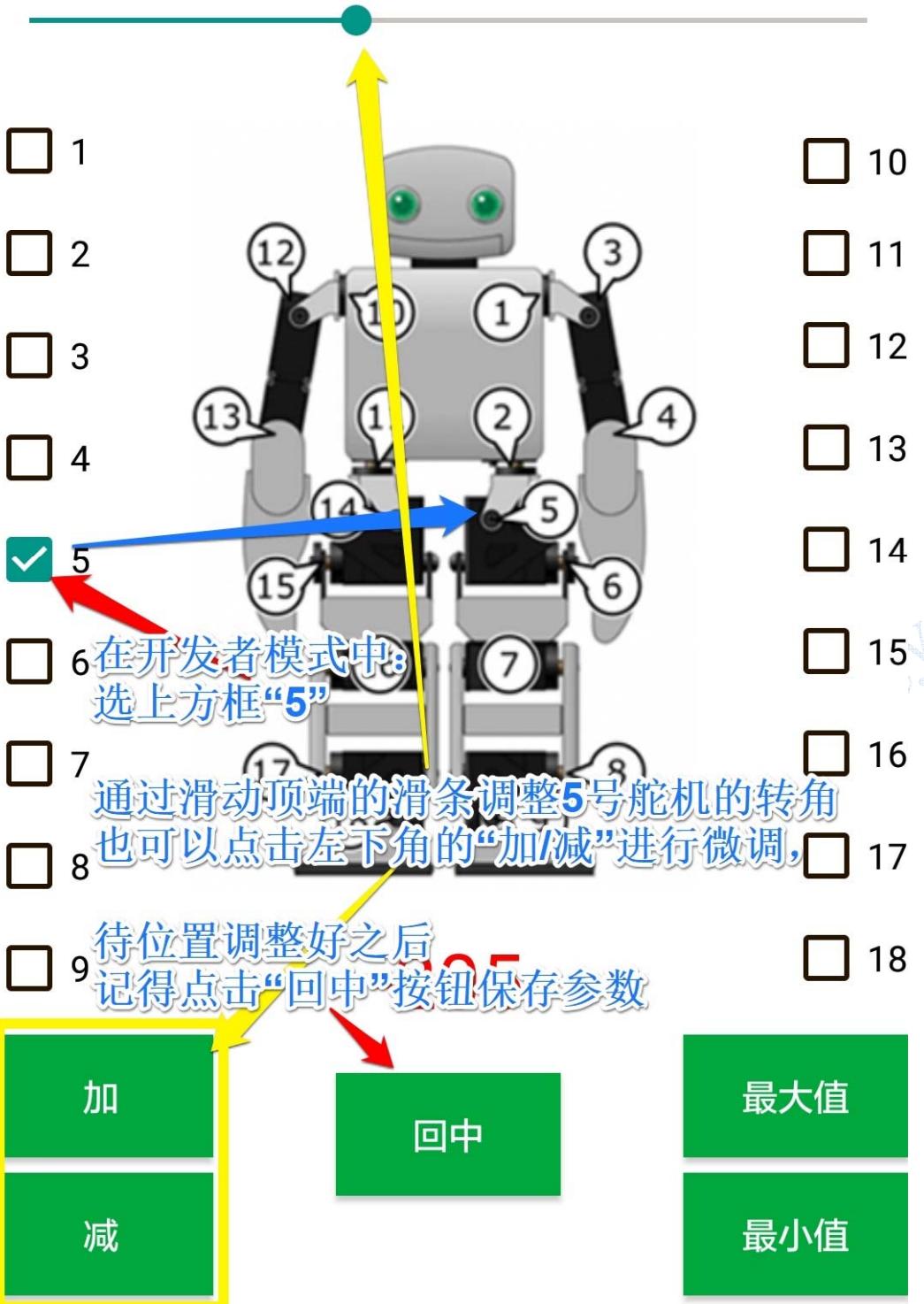
## &lt; 开发者模式



110



## ◀ 开发者模式



112



通过微调后可以观察到左右舵机支架(上)都与中框下沿已经比较平行了，接下来继续按腿部从上到下的顺序调整，调整“15号舵机”和“6号舵机”让左右小腿与初始化姿态一致

DoIt

113



## 控制

常规

玩盒子

踢足球



0A 摆盒子



0B 捡起盒子



0C 弯腰捡起



0D 接过盒子



0E 展示盒子



0F 交出盒子



10 扔盒子



11 放开盒子



12 弯腰放下

## 摇杆

在手机APP“界面B”（控制）中的上方向左滑动选中“玩盒子”一栏，然后点击第一行第3个“弯腰捡起”动作，观察机器人的双腿（尤其是小腿部分）的整齐程度



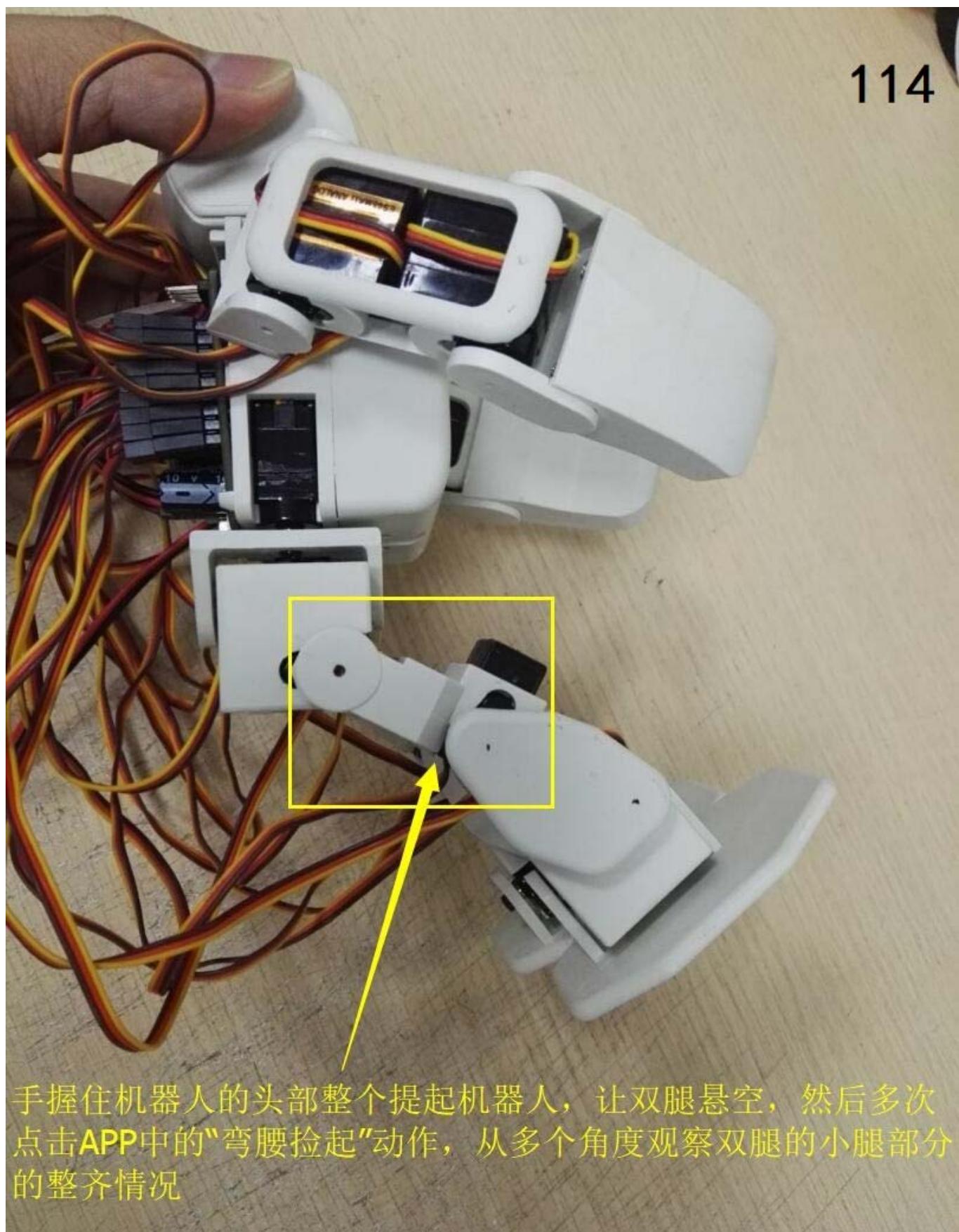
搜索



控制



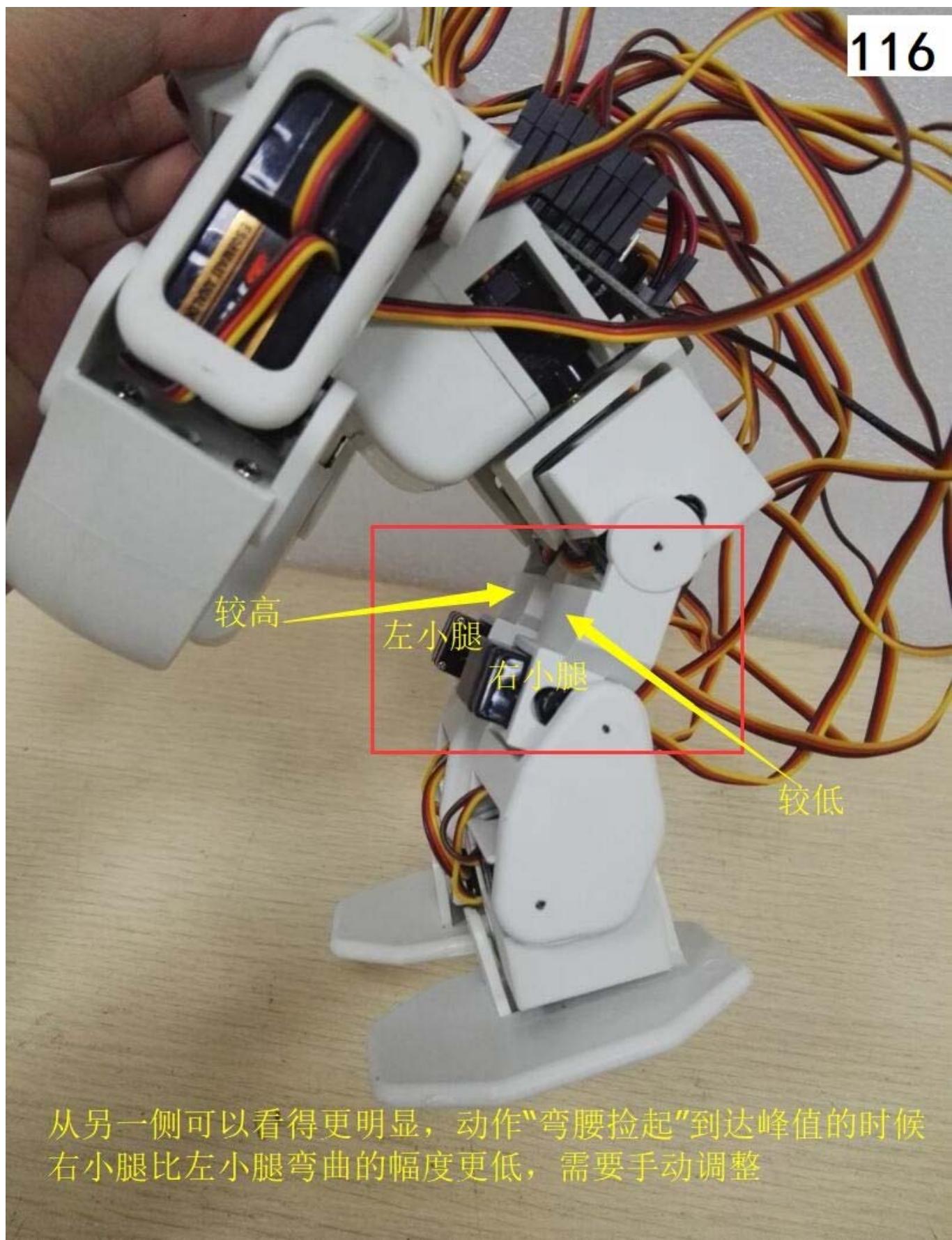
编程



手握住机器人的头部整个提起机器人，让双腿悬空，然后多次点击APP中的“弯腰捡起”动作，从多个角度观察双腿的小腿部分的整齐情况

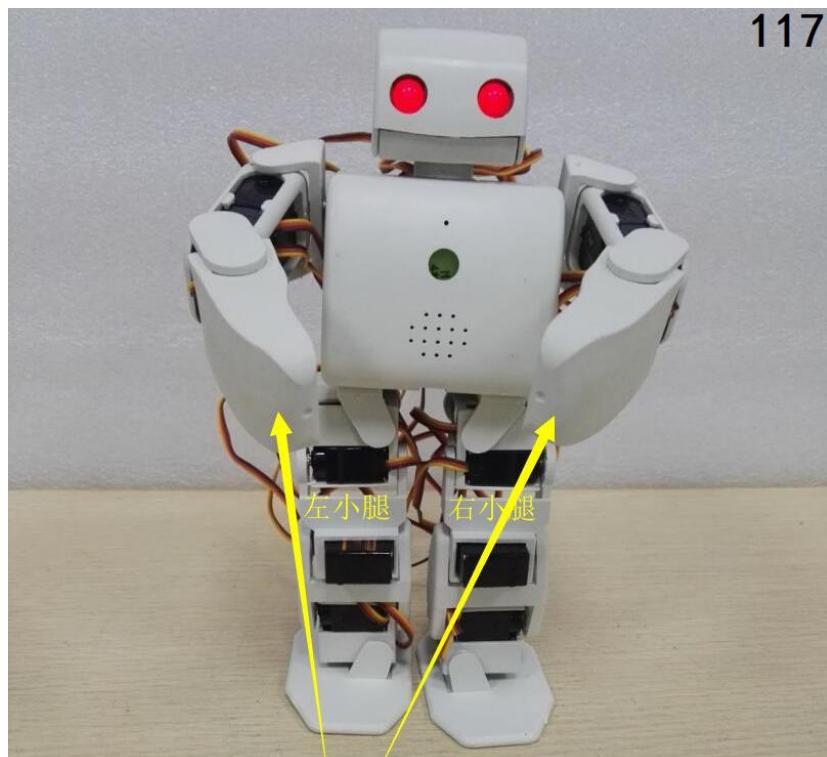


116



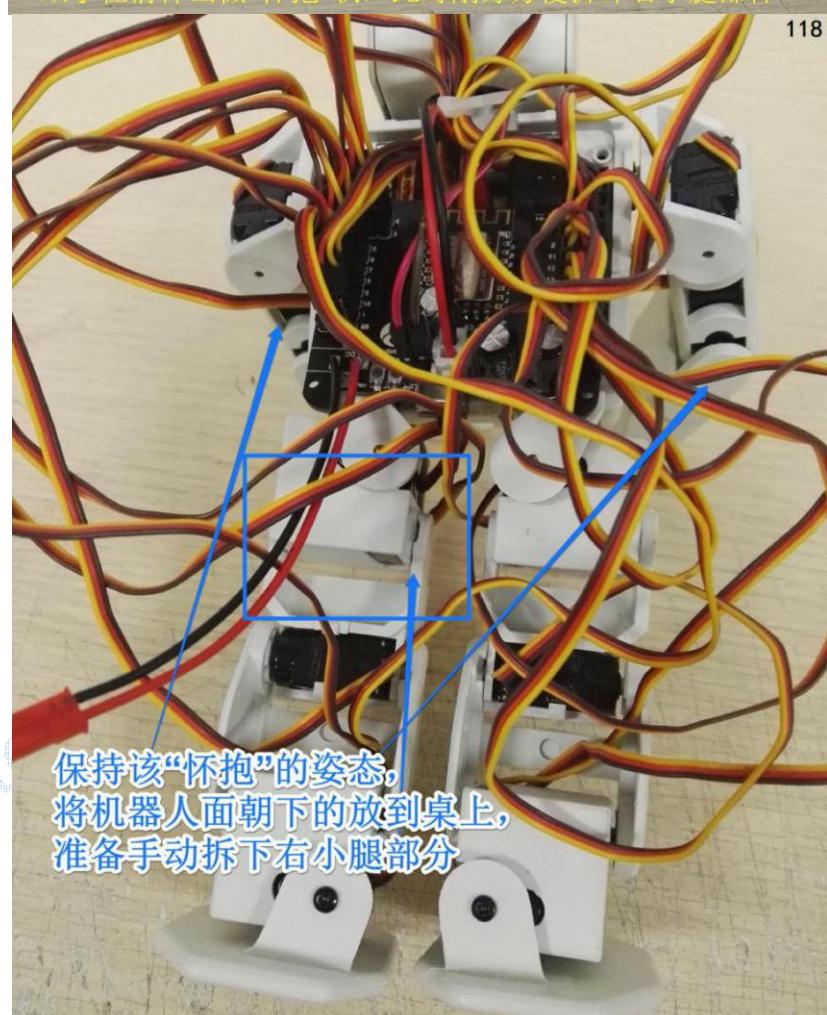
从另一侧可以看得更明显，动作“弯腰捡起”到达峰值的时候右小腿比左小腿弯曲的幅度更低，需要手动调整

117



点击动作“弯腰捡起”，机器人做完动作后会保持该姿态，双手往前伸出做“怀抱”状，此时刚好方便拆卸右小腿部件

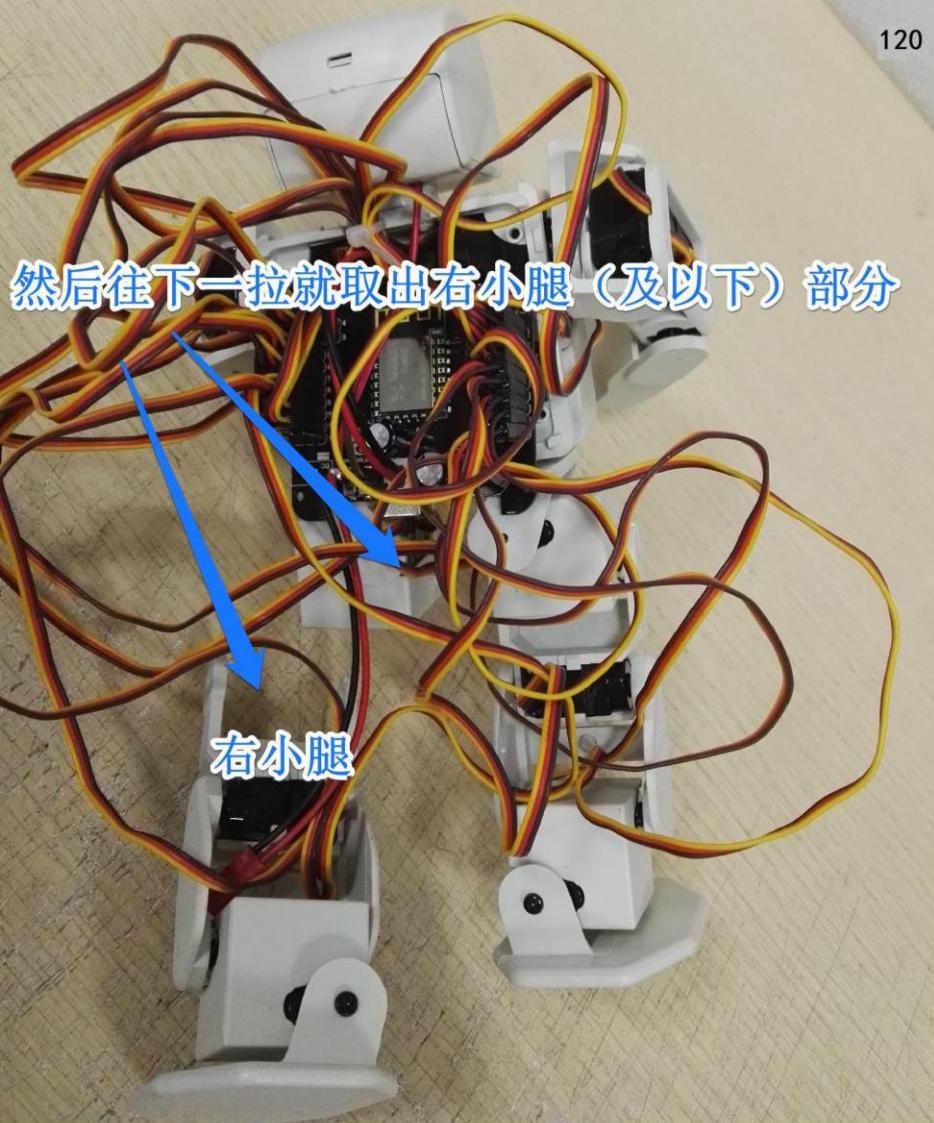
118



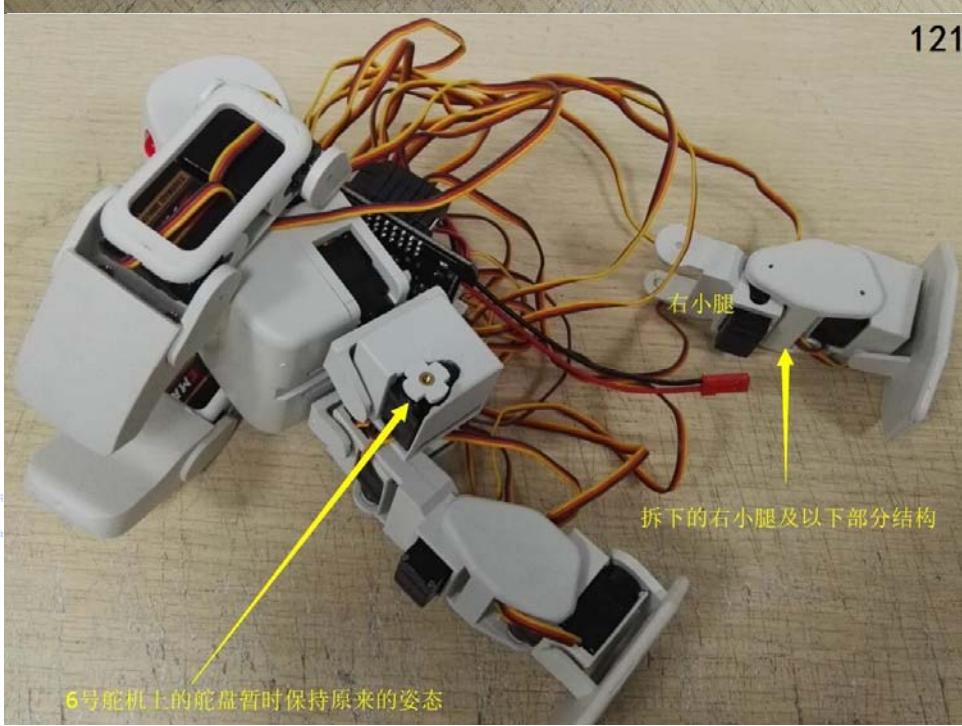
保持该“怀抱”的姿态，  
将机器人面朝下的放到桌上，  
准备手动拆下右小腿部分



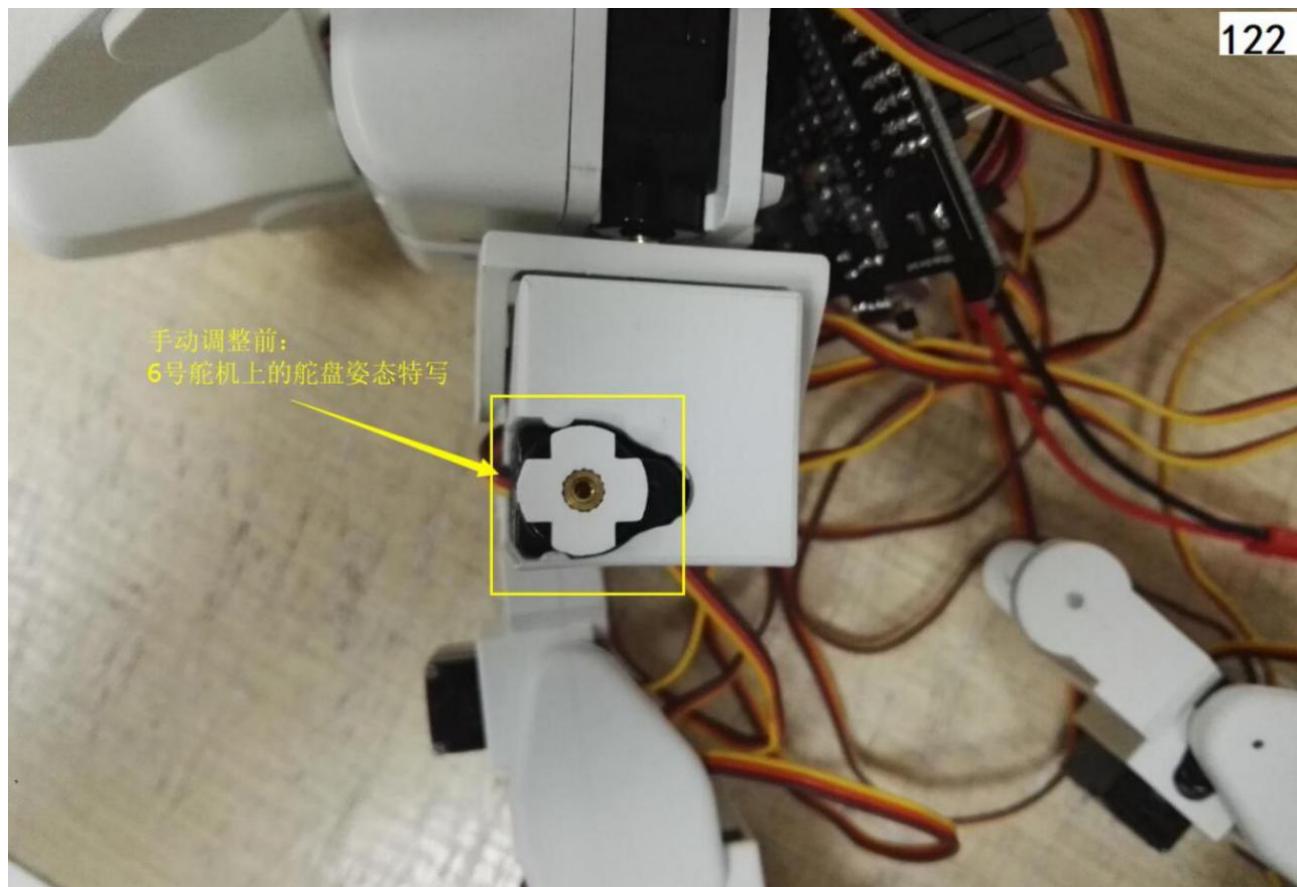
120



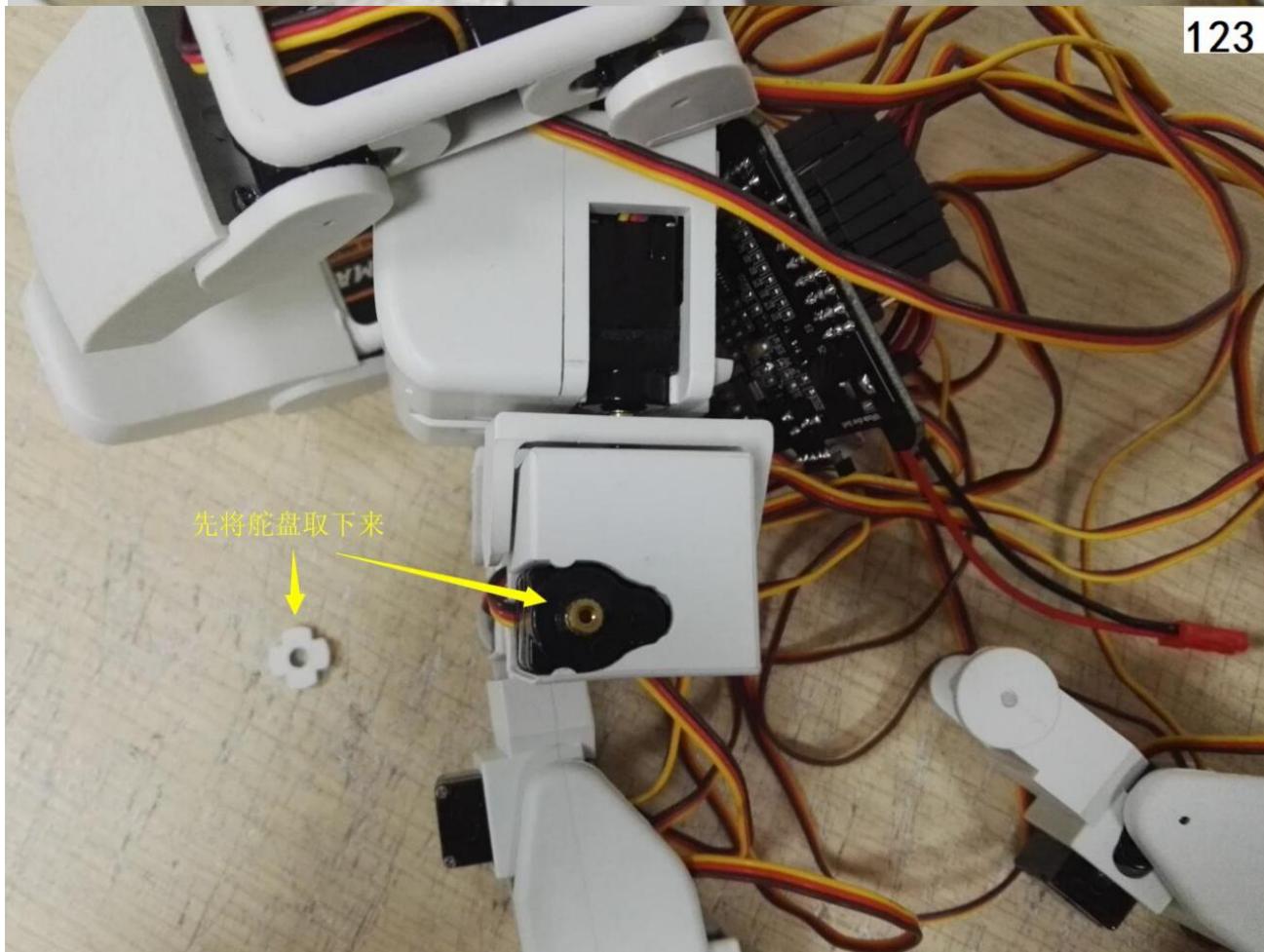
121



122



123



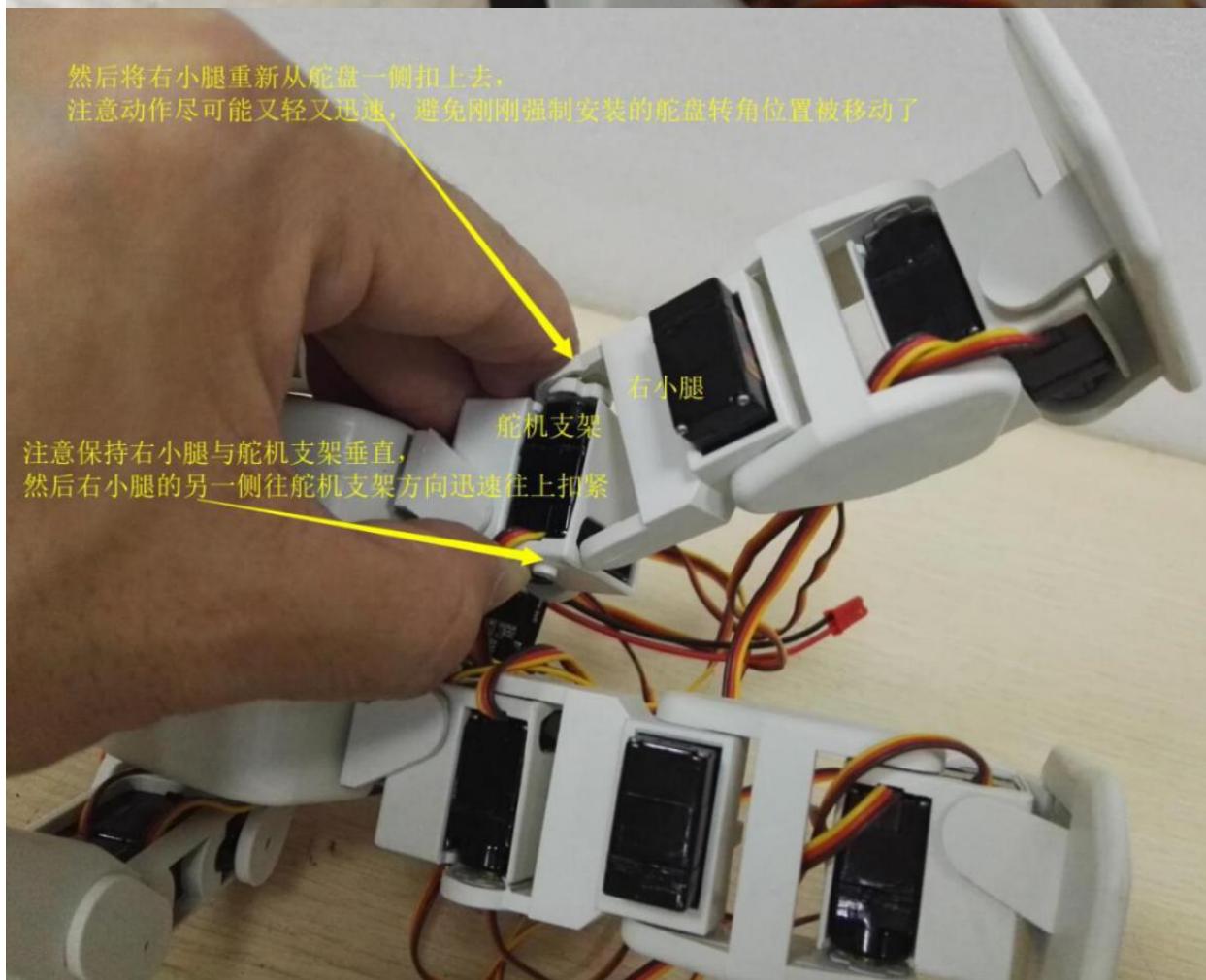
124



在之前的观察中得出结论是在动作“弯腰捡起”达到峰值时弯曲程度偏低，所以重新装上舵盘的时候要将舵盘稍微向左转一个小小的角度（比舵机转轴齿轮一格的角度小）。

特别注意：由于舵盘要装到的是处于前后2个舵机转轴齿轮的中间位置，属于强制性安装，所以需要用强力往下压才能让舵盘安装到舵机上，很可能需要重复按压几次才能成功装上，

125



注意保持右小腿与舵机支架垂直，  
然后右小腿的另一侧往舵机支架方向迅速往上扣紧

126



重新安装好的右小腿（相较之前略微往上抬起一点）

右小腿

127



迅速用黑色小螺丝锁住刚刚掰开重装的右小腿所在的6号舵机

右小腿

6号舵机



129  
再次手握住机器人头部整个提起，让双腿自然下垂，  
可以发现当前的状态是刚被手动调整的右小腿一侧比左侧稍微  
往前太高一点点，  
点击APP的“弯腰捡起”动作，准备观察左右小腿的整齐程度

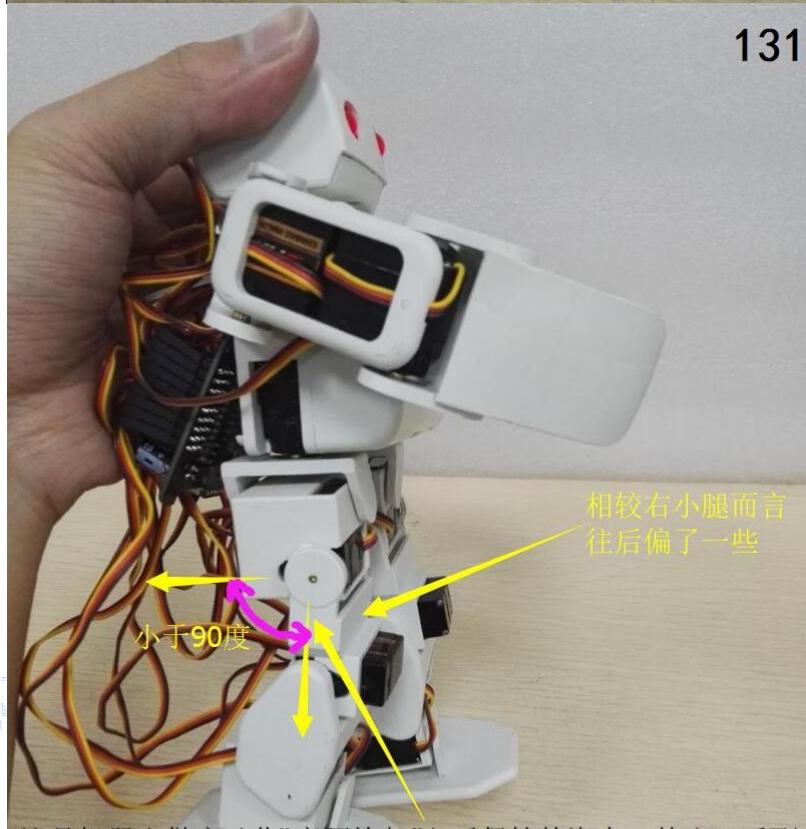


130



机器人的“弯腰捡起”动作的执行情况，  
从这一侧可以观察到左右两小腿已经比较整齐了

131



这是机器人做完动作“弯腰捡起”之后保持的姿态，伸出双手刚好便于观察双腿的整齐度，可以看出平常状态下左右腿的小腿部分是左小腿偏往后一些，由于左小腿与舵机支架的夹角小于90度，故优先微调左小腿所在的15号舵机使左右小腿转角一致

## ◀ 开发者模式

- 
- 1 在开发者模式中:  
选上方框“15”
- 2 通过滑动顶端的滑条调整15号舵机的转角  
也可以点击左下角的“加/减”进行微调,
- 3 待位置调整好之后
- 4 记得点击“回中”按钮保存参数
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18

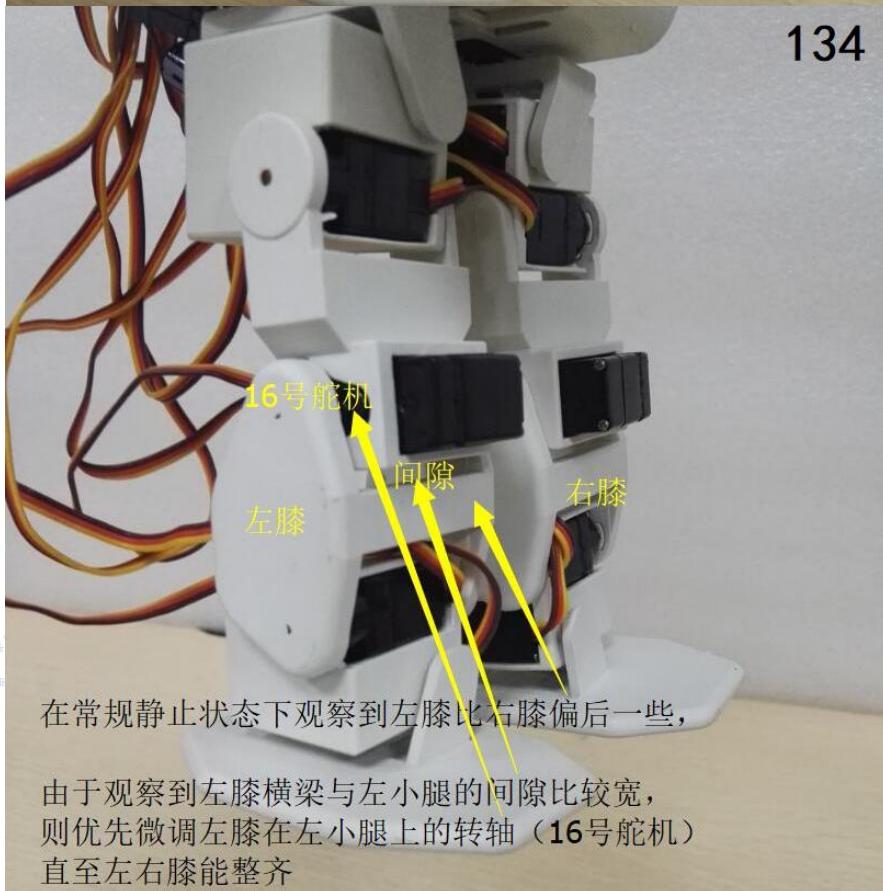


133



在常规状态下用APP微调15号舵机直至左右小腿能整齐

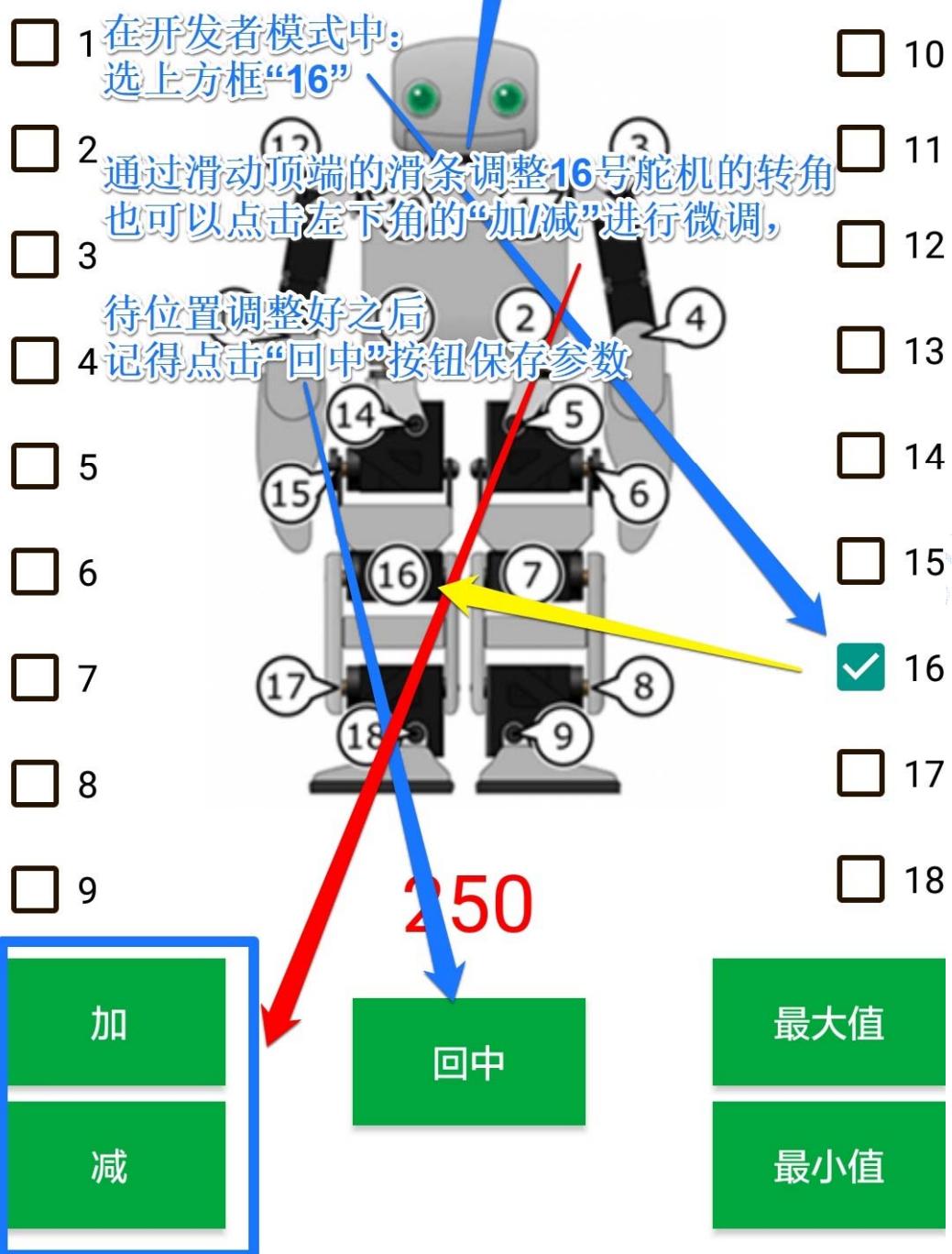
134



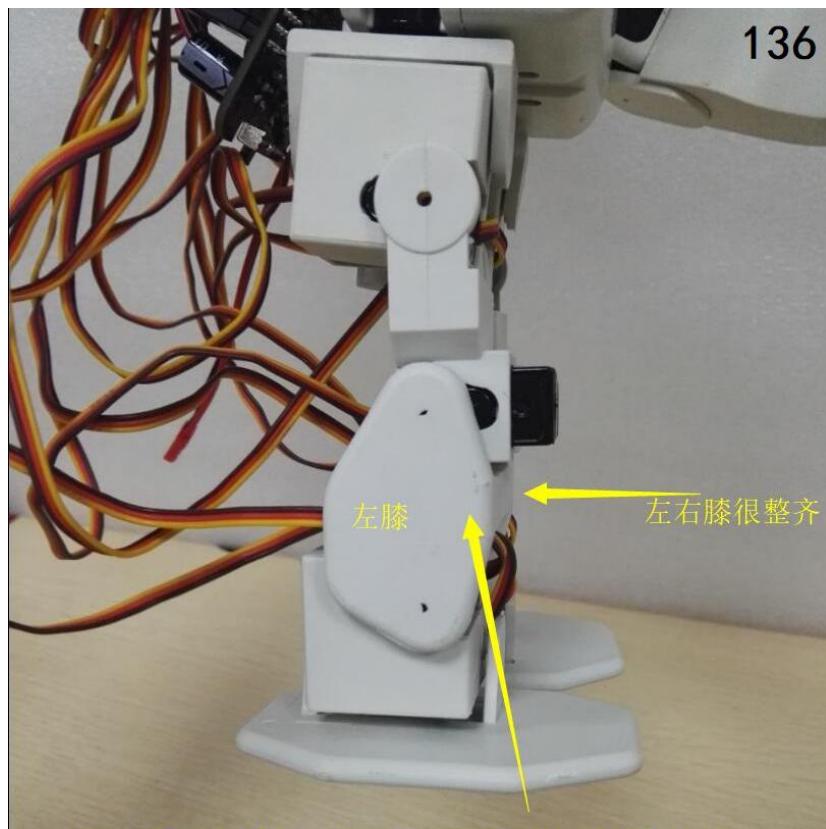
在常规静止状态下观察到左膝比右膝偏后一些，

由于观察到左膝横梁与左小腿的间隙比较宽，则优先微调左膝在左小腿上的转轴（16号舵机）直至左右膝能整齐

## ◀ 开发者模式

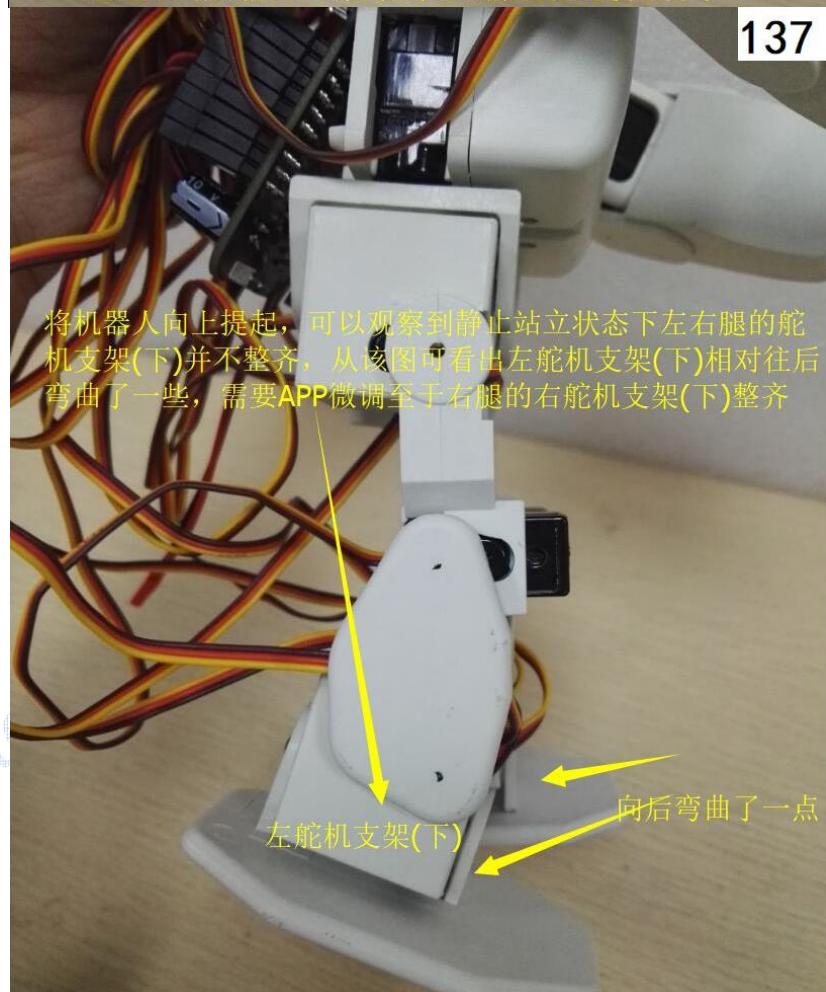


136



通过APP微调后可以观察到左右膝已经比较整齐了

137

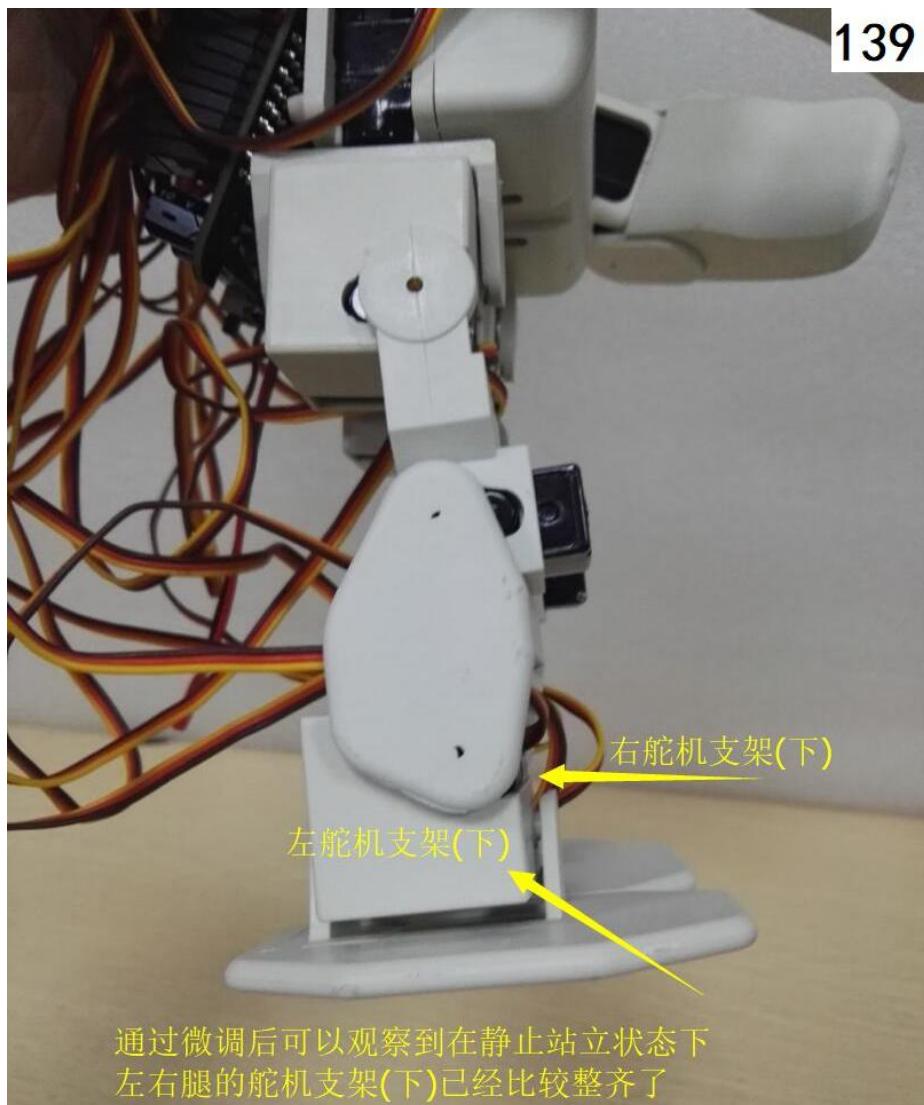


将机器人向上提起，可以观察到静止站立状态下左右腿的舵机支架(下)并不整齐，从该图可看出左舵机支架(下)相对往后弯曲了一点，需要APP微调至于右腿的右舵机支架(下)整齐

## ◀ 开发者模式

- 
- 1 在开发者模式中:  
选上方框“17”  
 2 通过滑动顶端的滑条调整17号舵机的转角  
也可以点击左下角的“加/减”进行微调,  
 3 待位置调整好之后  
 4 记得点击“回中”按钮保存参数
- 10       11       12       13       14       15       16       17       18
- 5       6       7       8       9
- 14       15       16
- 加       最大值  
 减       最小值

139



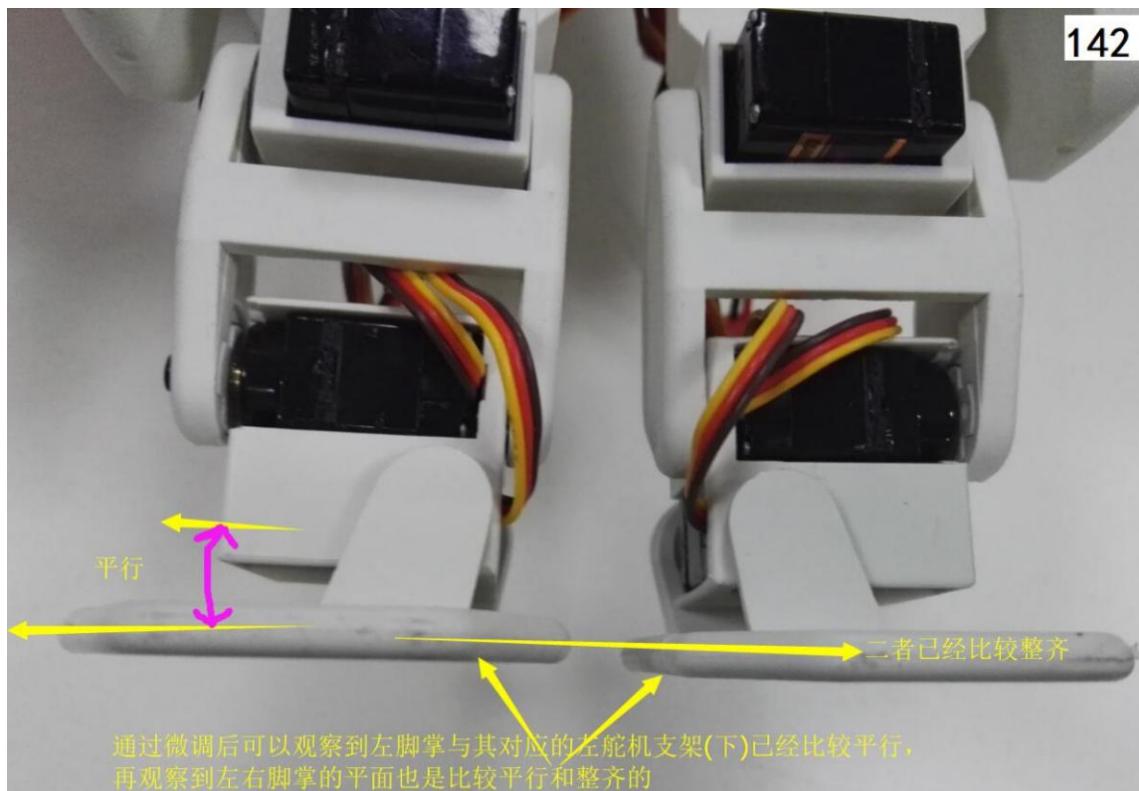
140





- 1 在开发者模式中:  
选上方框“18”
- 2 通过滑动顶端的滑条调整18号舵机的转角
- 3 也可以点击左下角的“加/减”进行微调,
- 4 待位置调整好之后  
记得点击“回中”按钮保存参数
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18



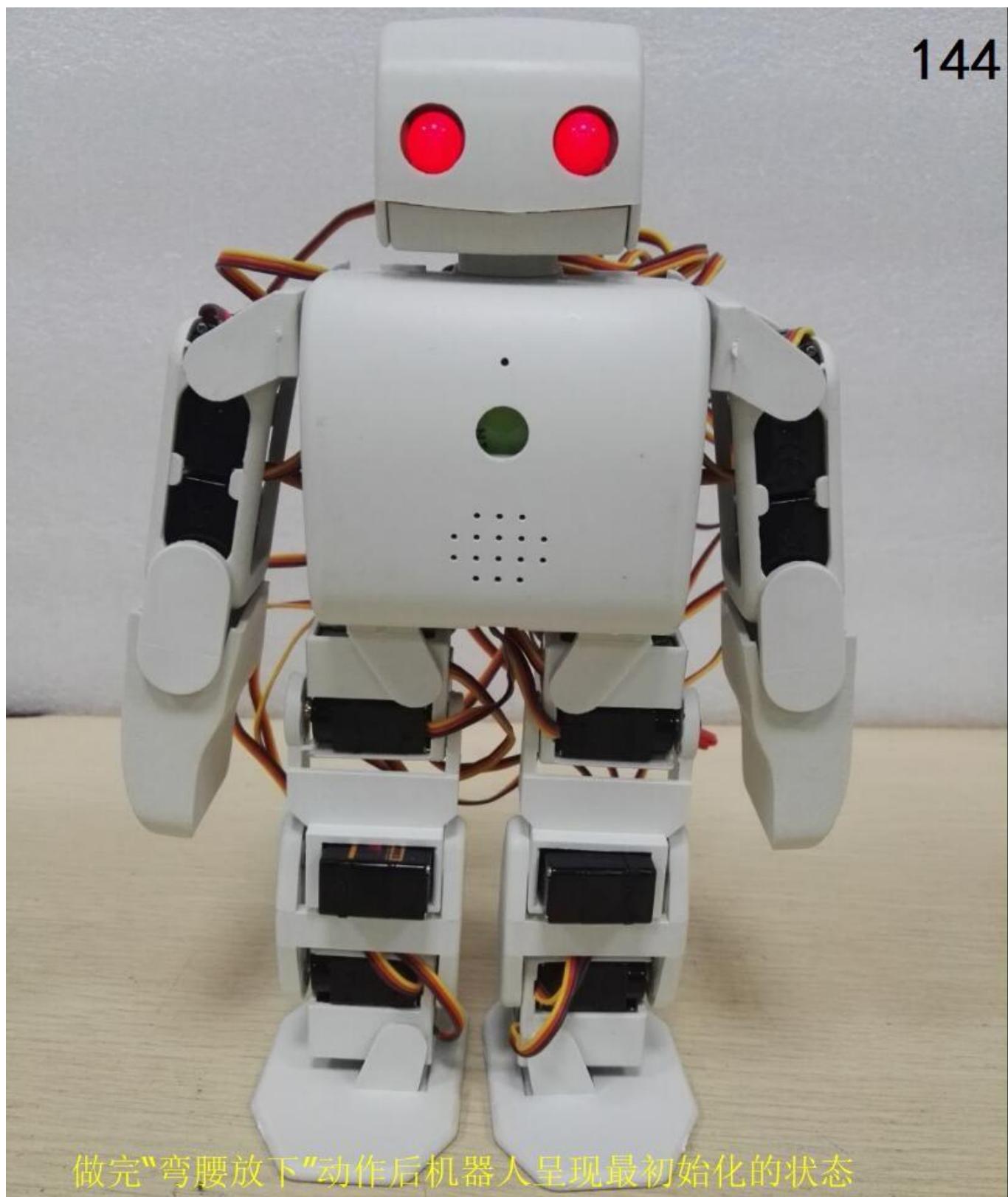


143



将腿部已经调整好的机器人(一直保持做完“弯腰捡起”动作后的姿态)重新放到桌面上，观察到机器人站姿平稳，也不再听到舵机的吱吱声，再在APP上点击“弯腰放下”观察到舵机不会摔倒，说明双腿已经调整完毕

144



做完“弯腰放下”动作后机器人呈现最初始化状态

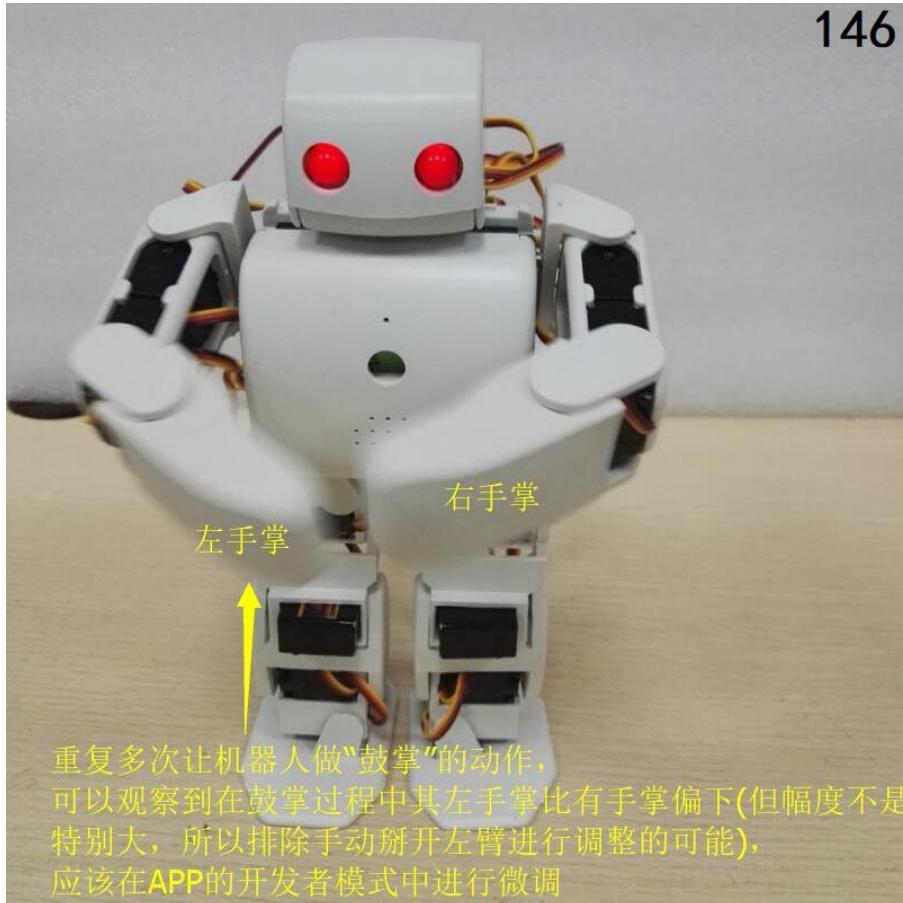
DOIT

### ③ Debug your hands

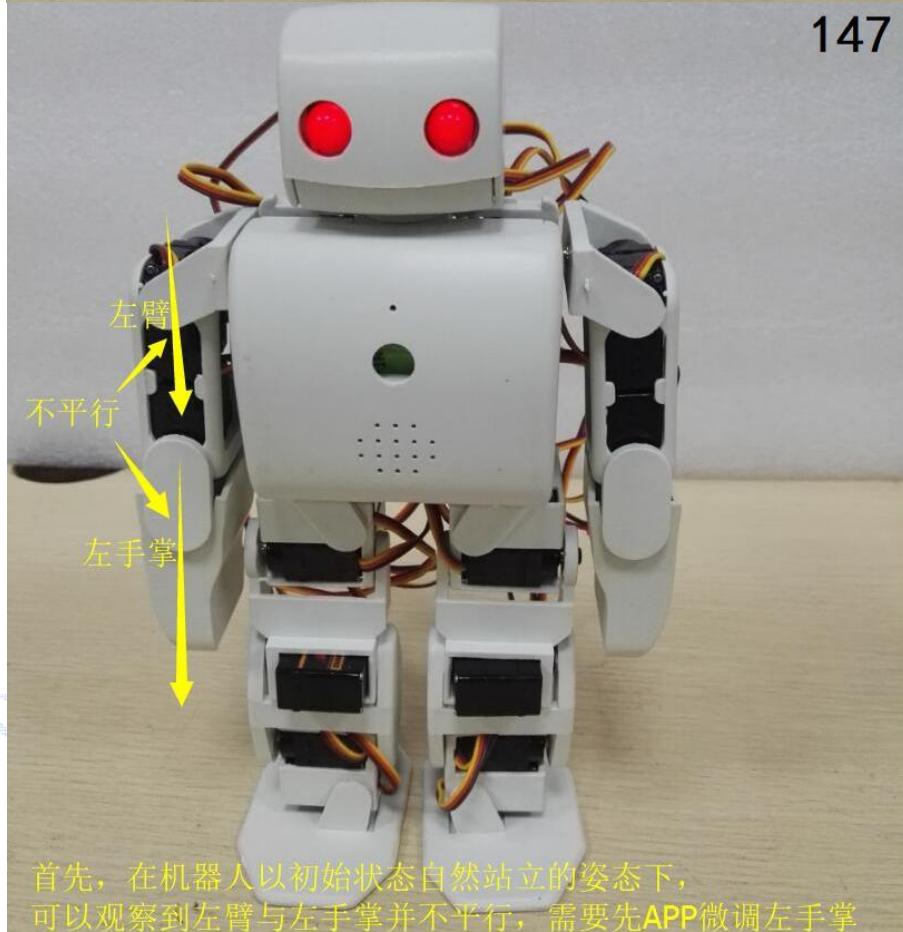
145



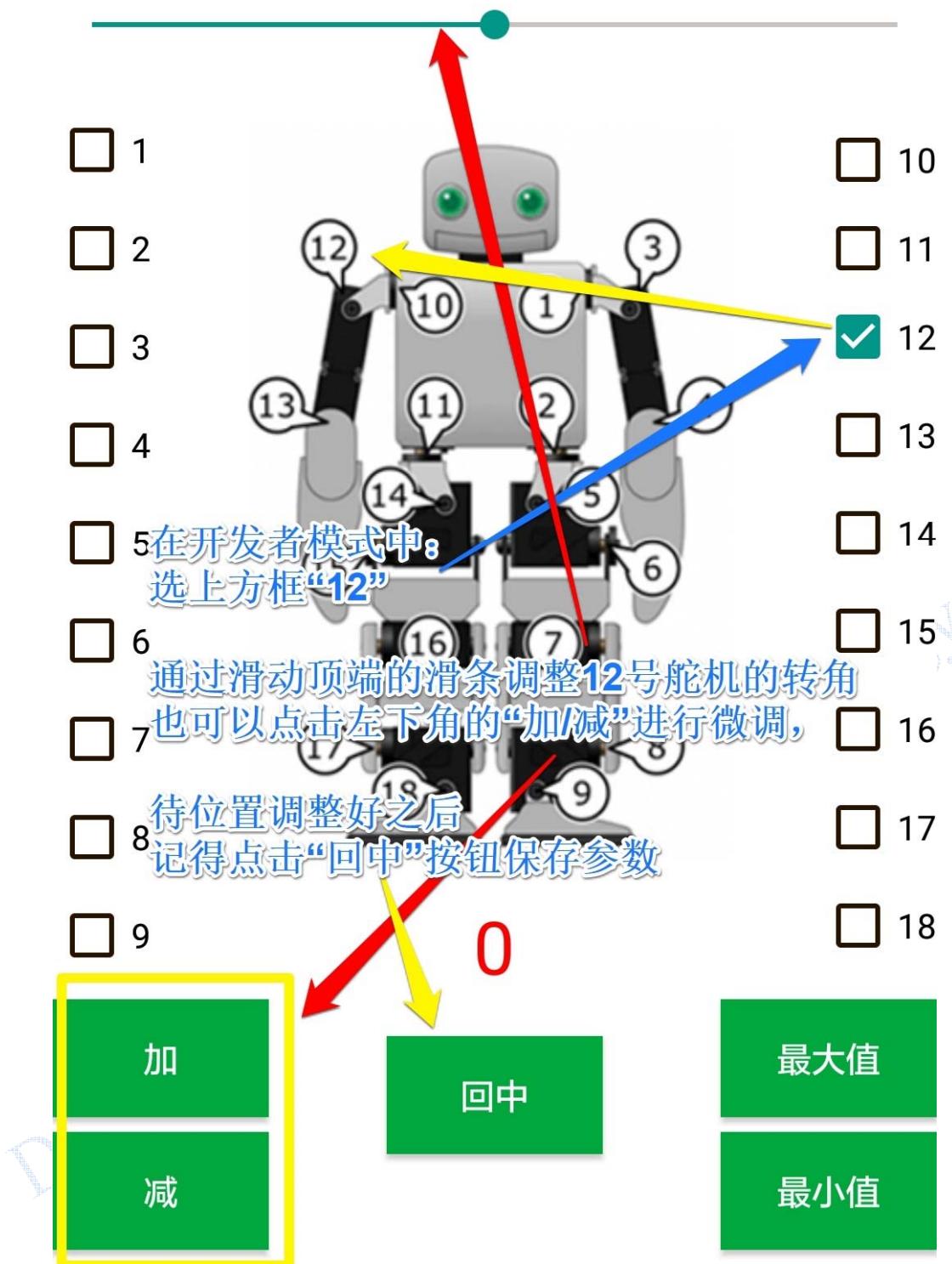
146



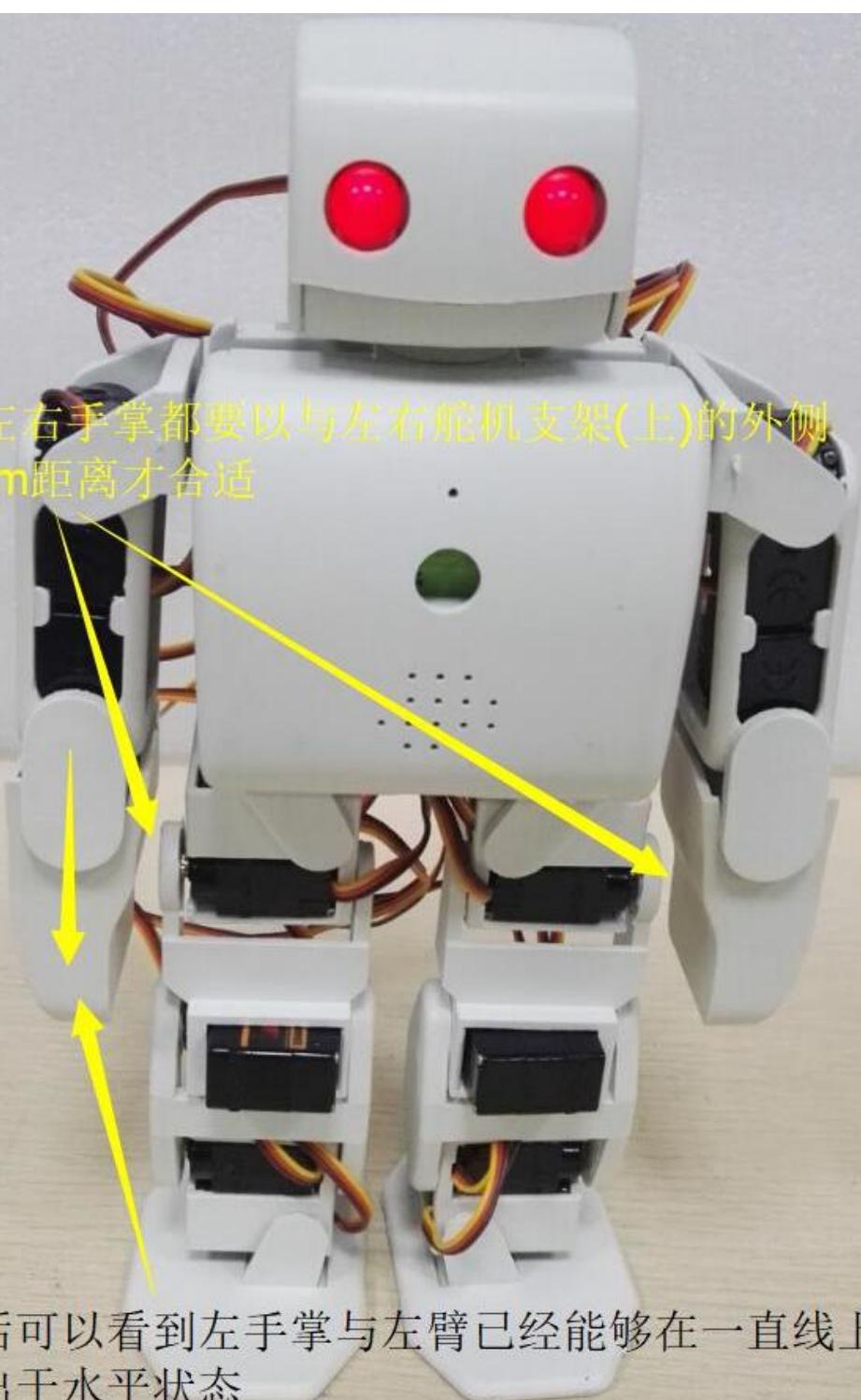
147



## ◀ 开发者模式



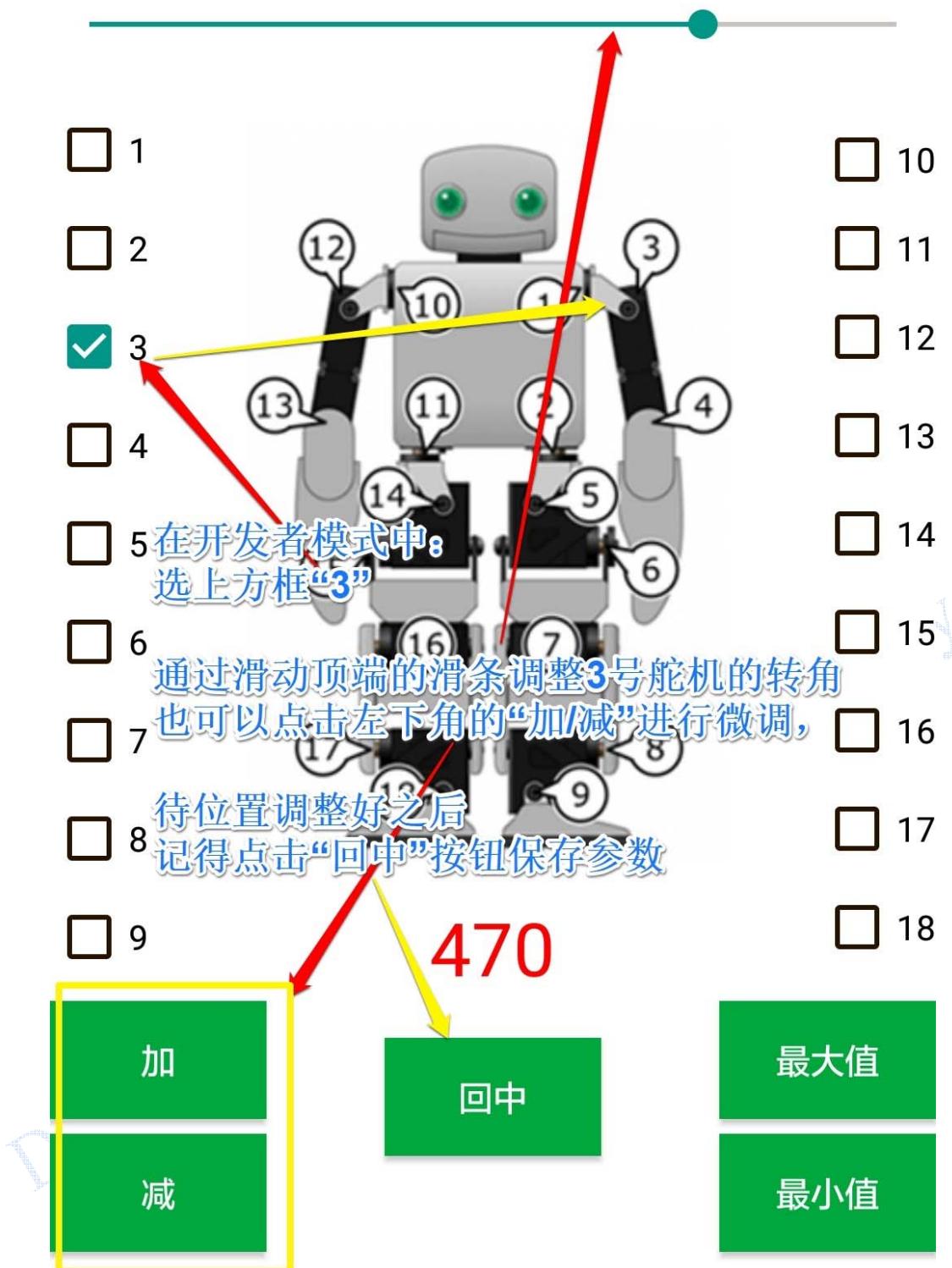
注意：左右手掌都要以与左右舵机支架(上)的外侧  
间隔2mm距离才合适



经过微调后可以看到左手掌与左臂已经能够在一直线上，  
即是二者出于水平状态

150

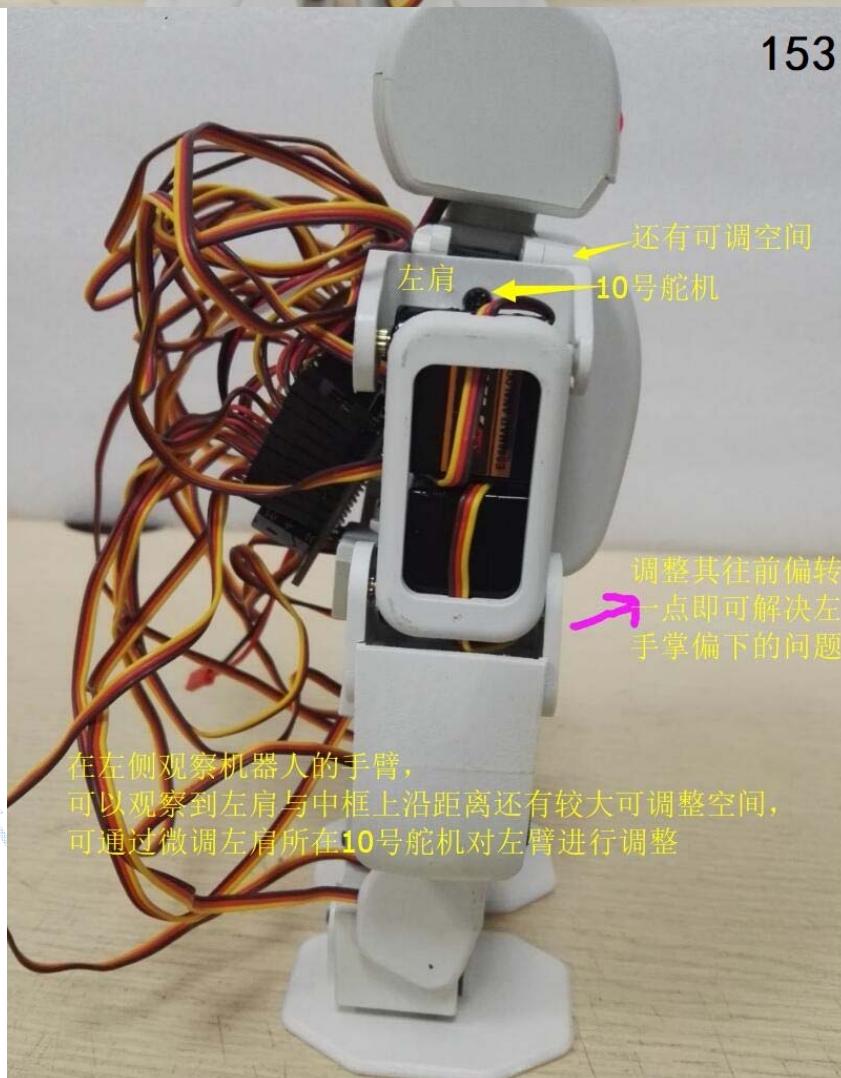
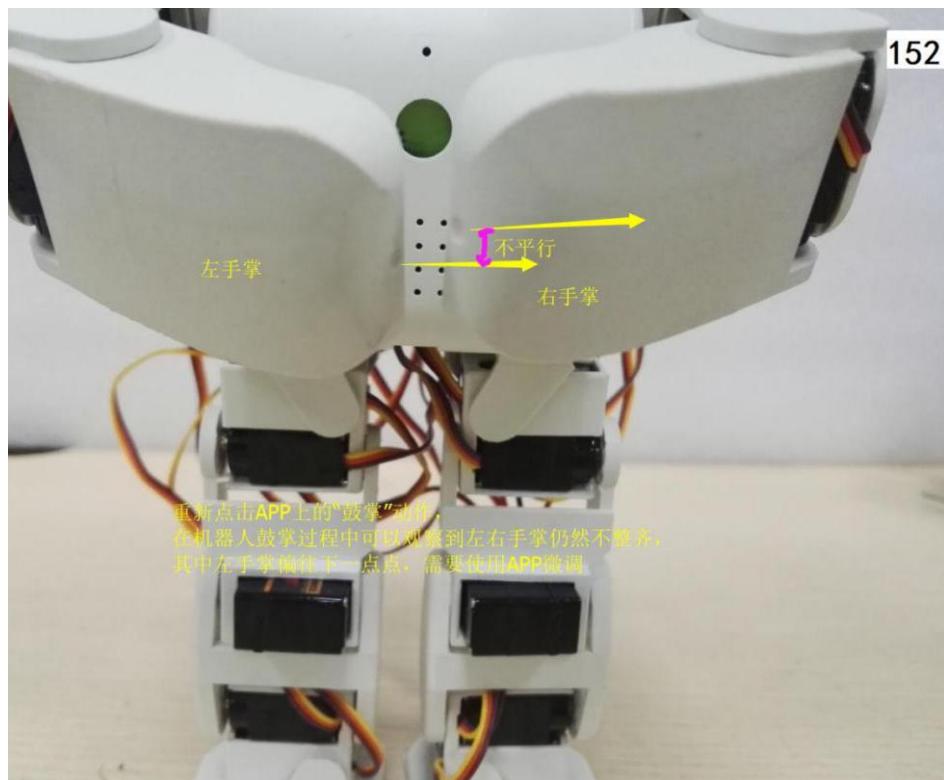
## ◀ 开发者模式



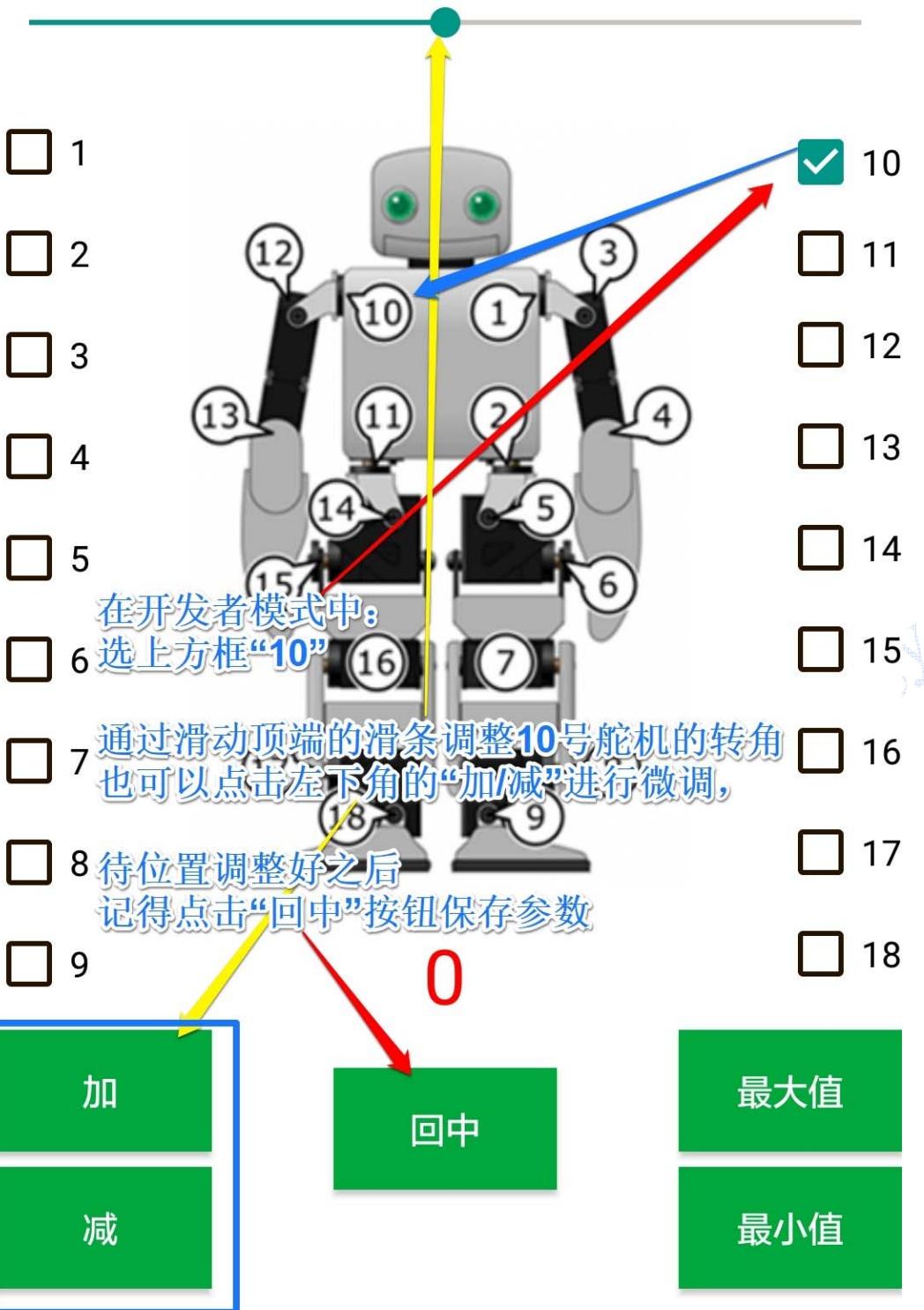
151

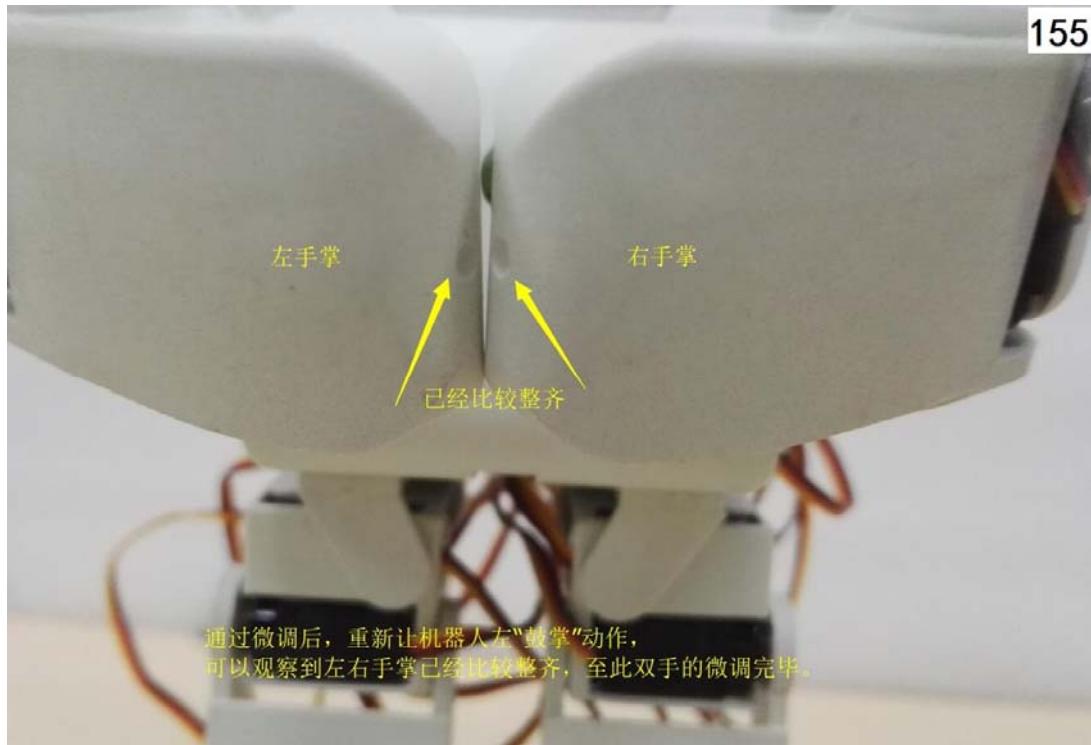


DOIT

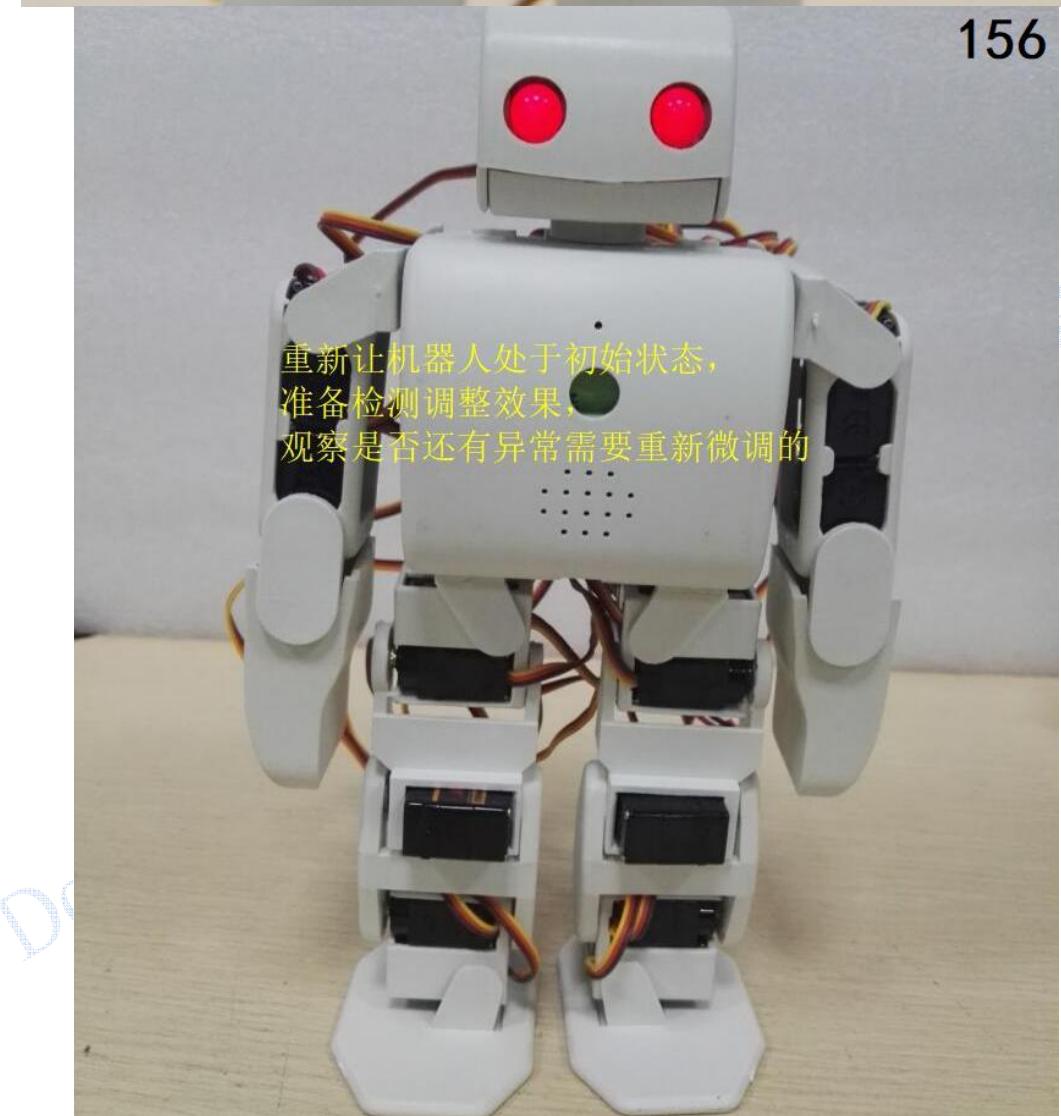


## ◀ 开发者模式





155



156

157

“弯腰捡起”①



将机器人放到桌面上，  
然后点击“弯腰捡起”，  
观察微调效果

158

“弯腰捡起”②



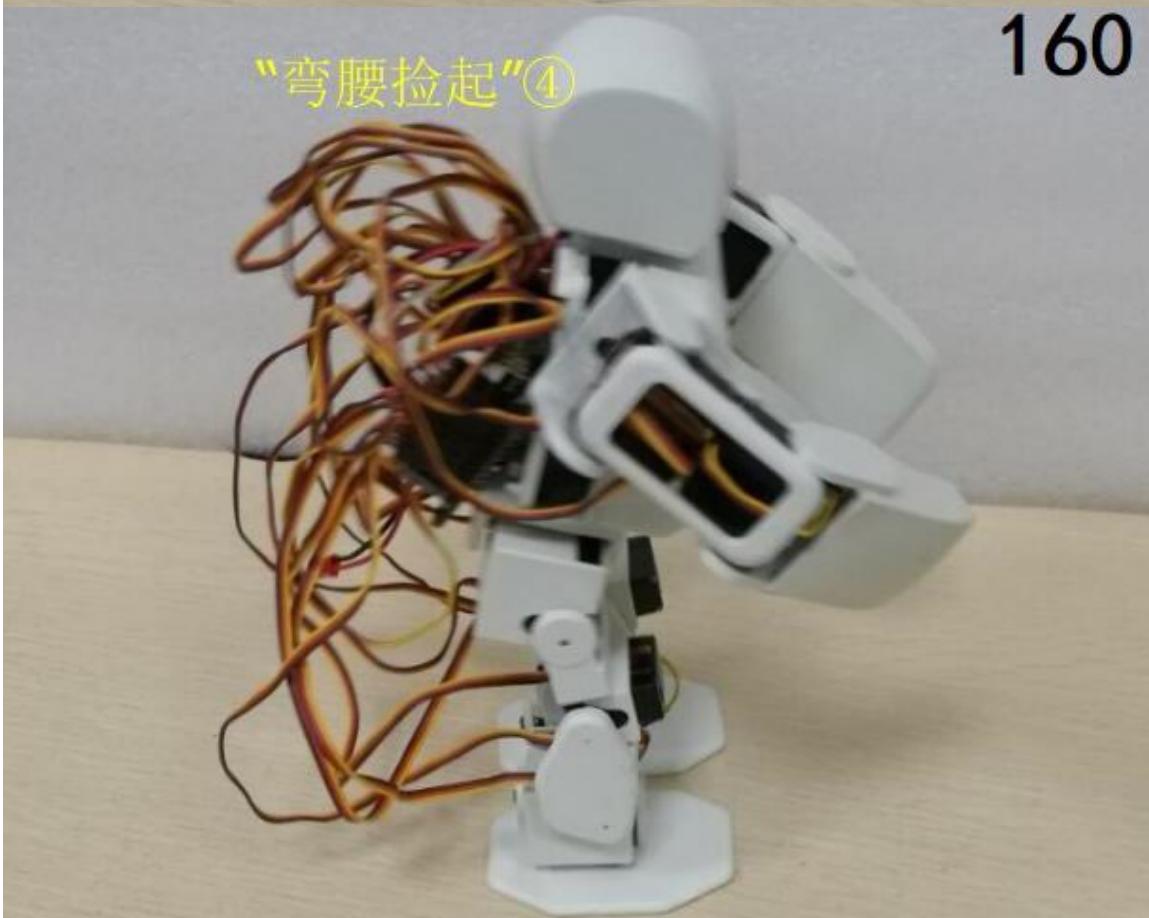
159

“弯腰捡起”③



160

“弯腰捡起”④



161

“弯腰捡起”正面视角①



162

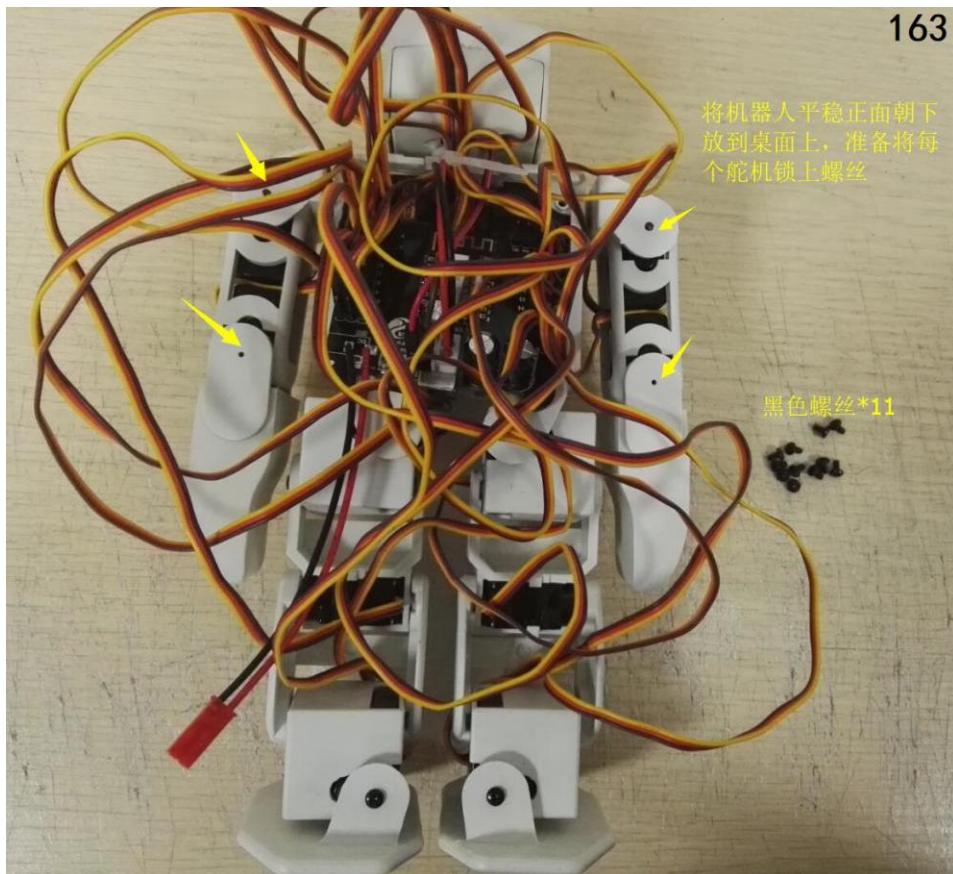
“弯腰捡起”正面视角②



综合以上①~⑤的动作效果图可得出结论：  
机器人动作平稳，APP微调宣告成功结束。

**h. Lock the screw**

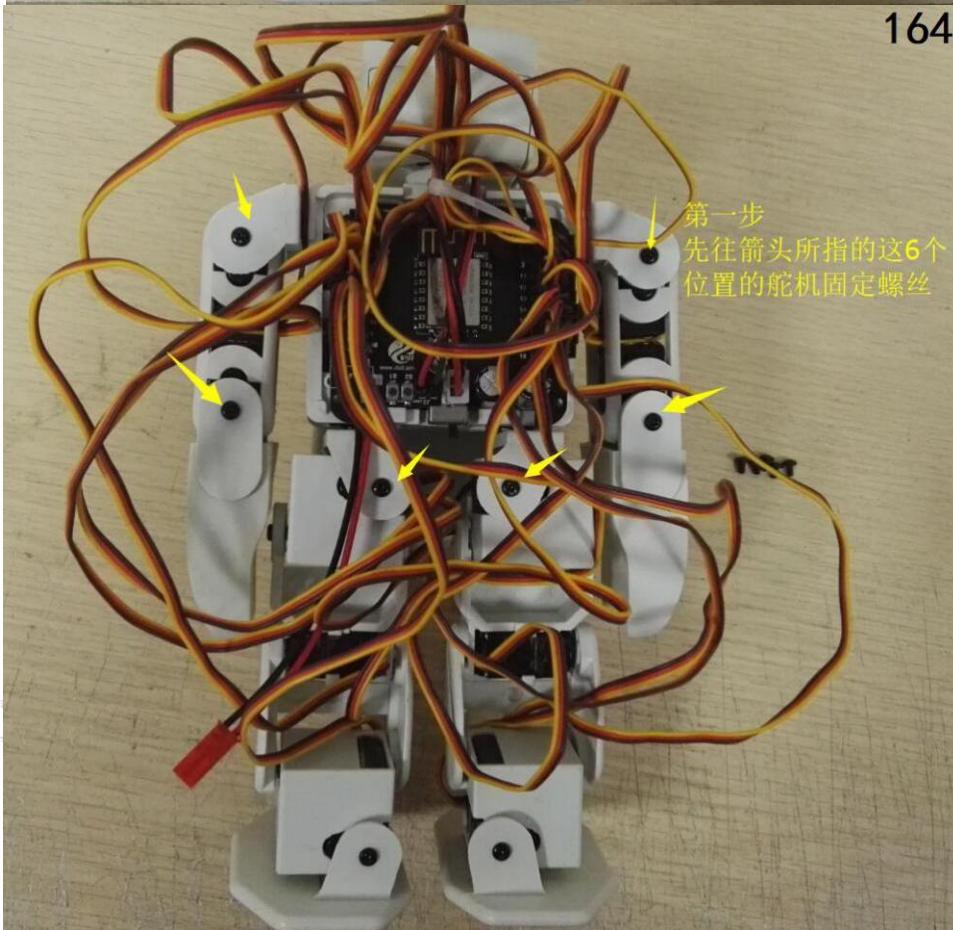
163



将机器人平稳正面朝下  
放到桌面上，准备将每个舵机锁上螺丝

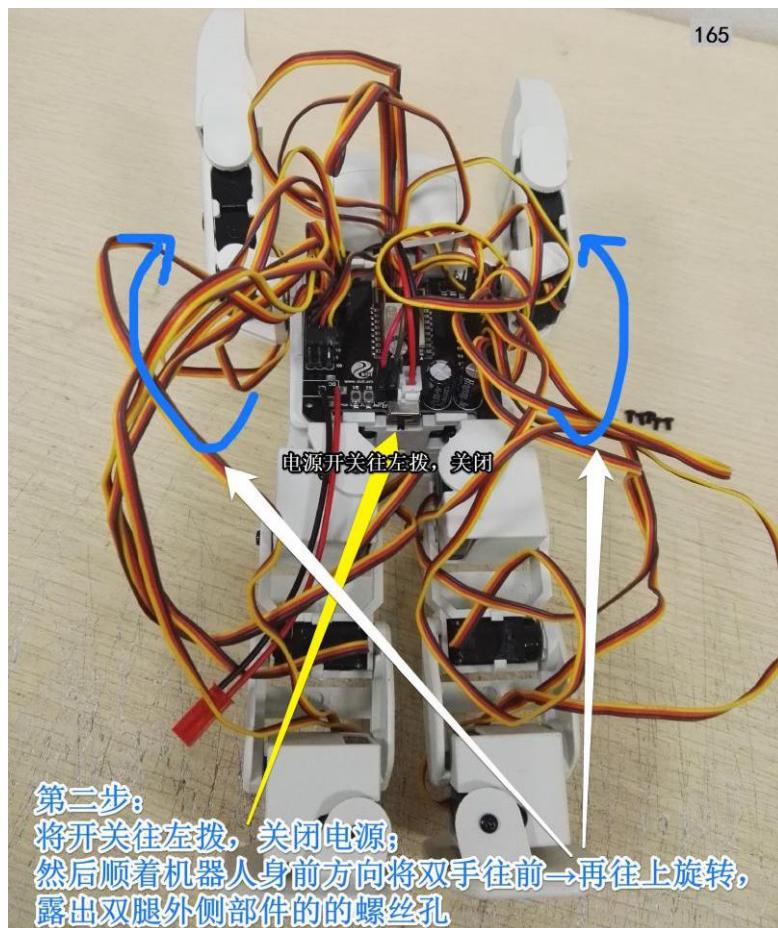
黑色螺丝\*11

164



第一步  
先往箭头所指的这6个  
位置的舵机固定螺丝

165



166



167



168

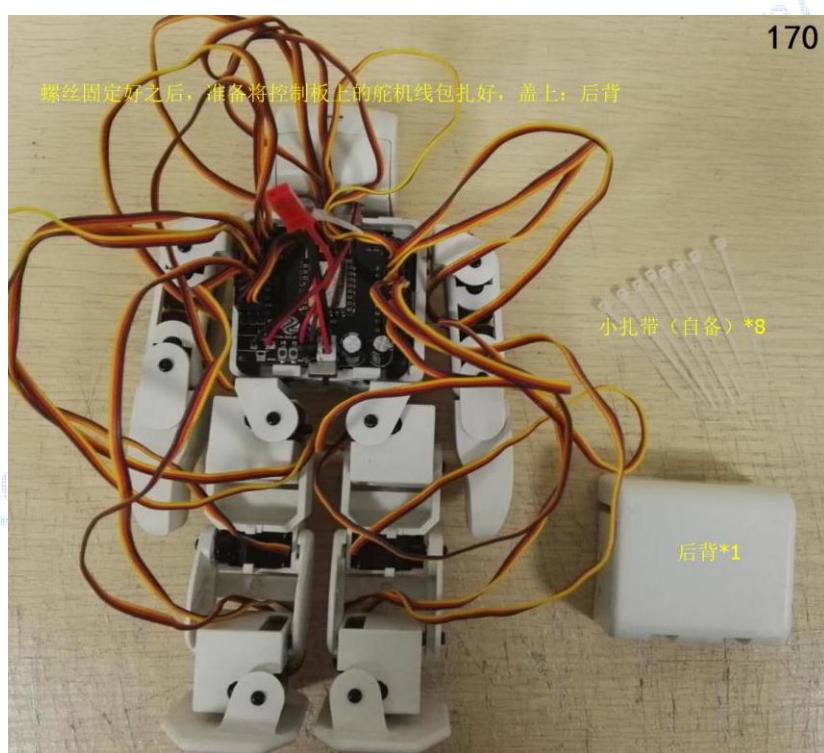


169



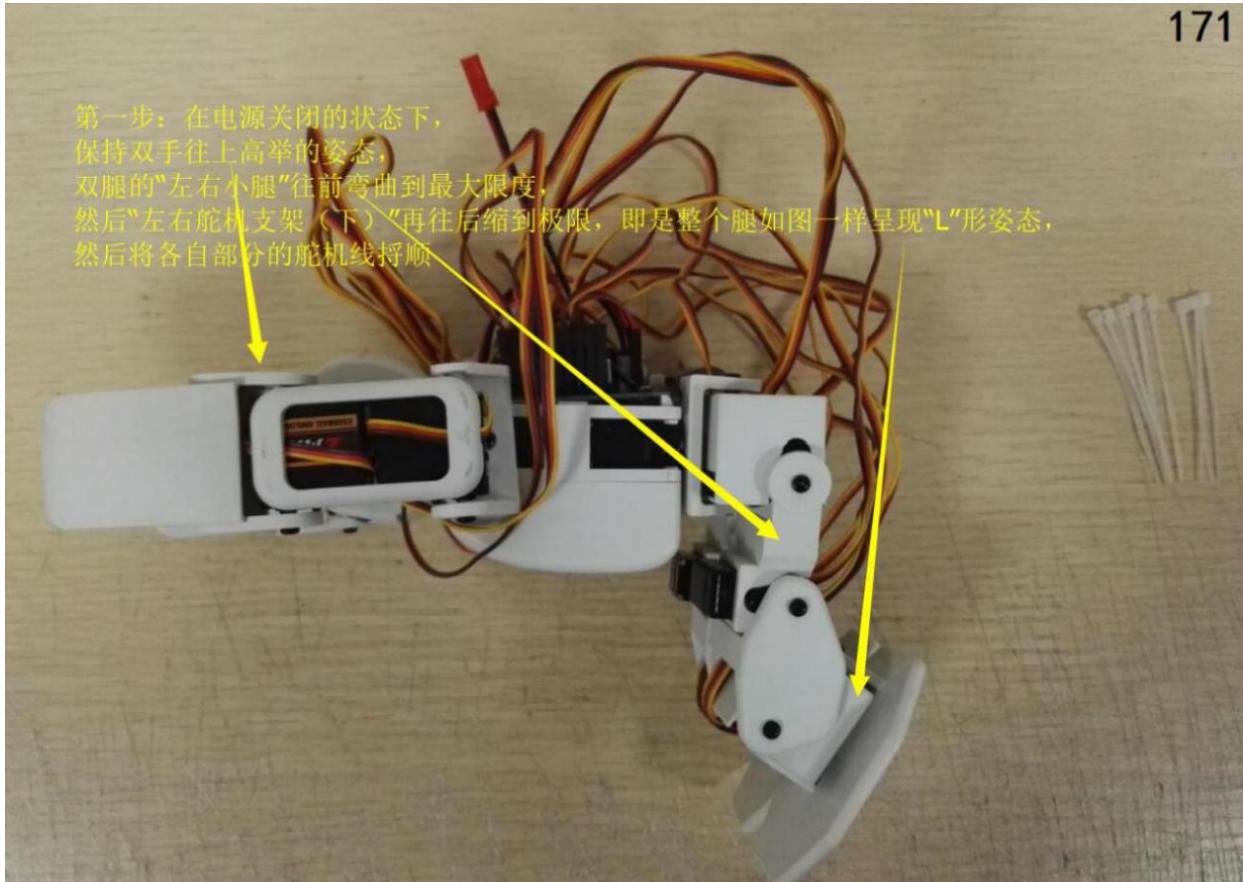
### i. Mount on the back

170

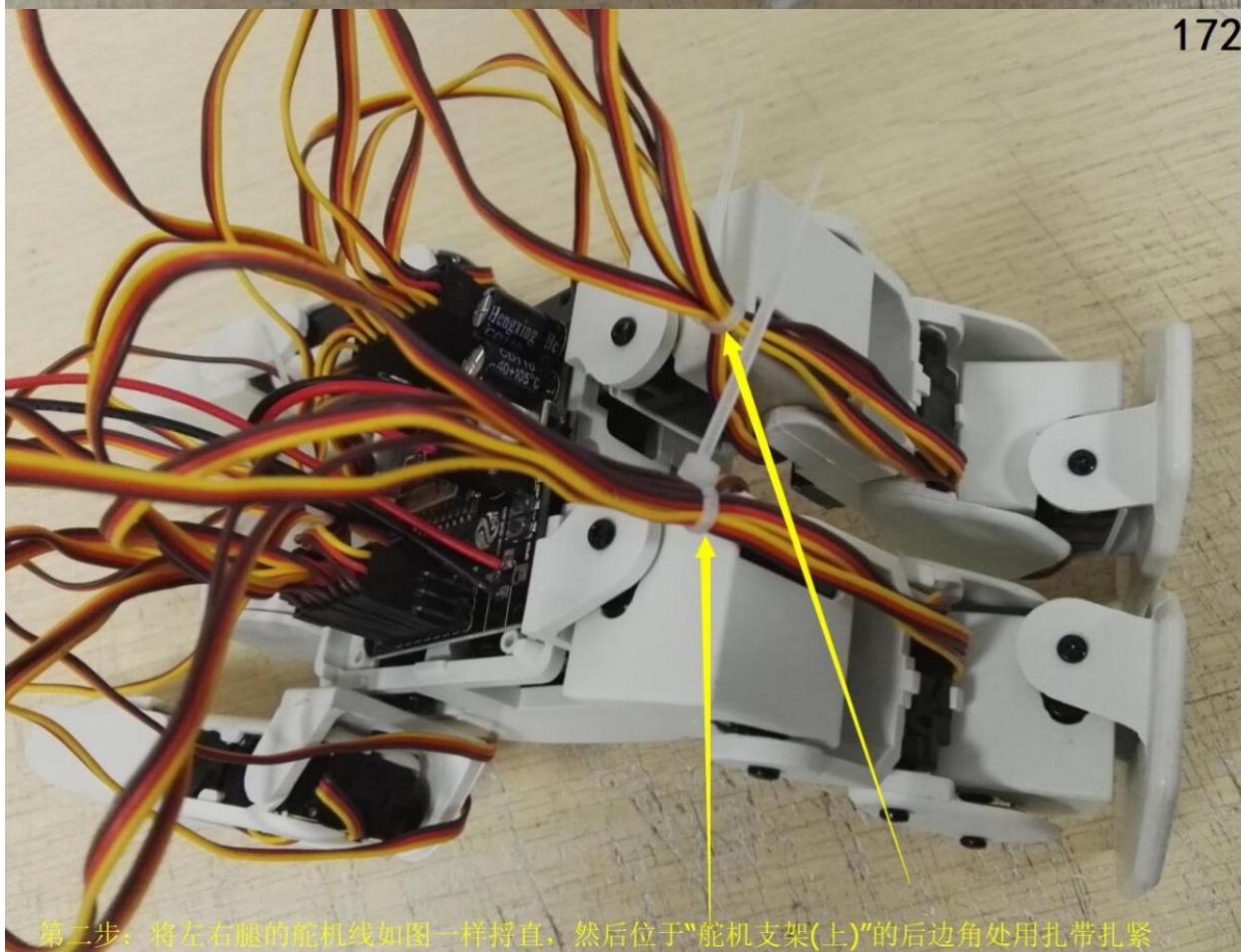


171

第一步：在电源关闭的状态下，  
保持双手往上高举的姿态，  
双腿的“左右小腿”往前弯曲到最大限度，  
然后“左右舵机支架（下）”再往后缩到极限，即是整个腿如图一样呈现“L”形姿态，  
然后将各自部分的舵机线捋顺。

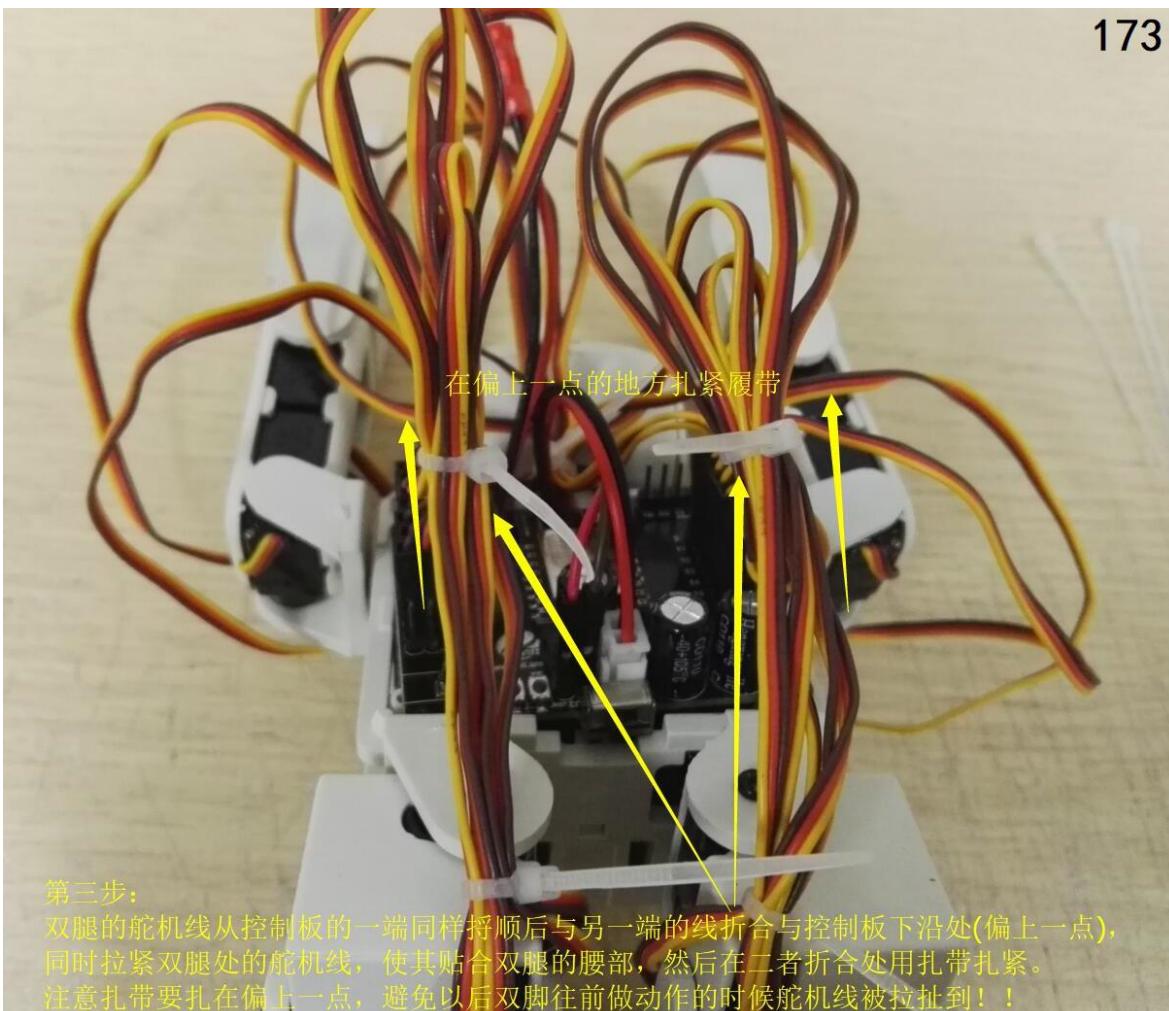


172



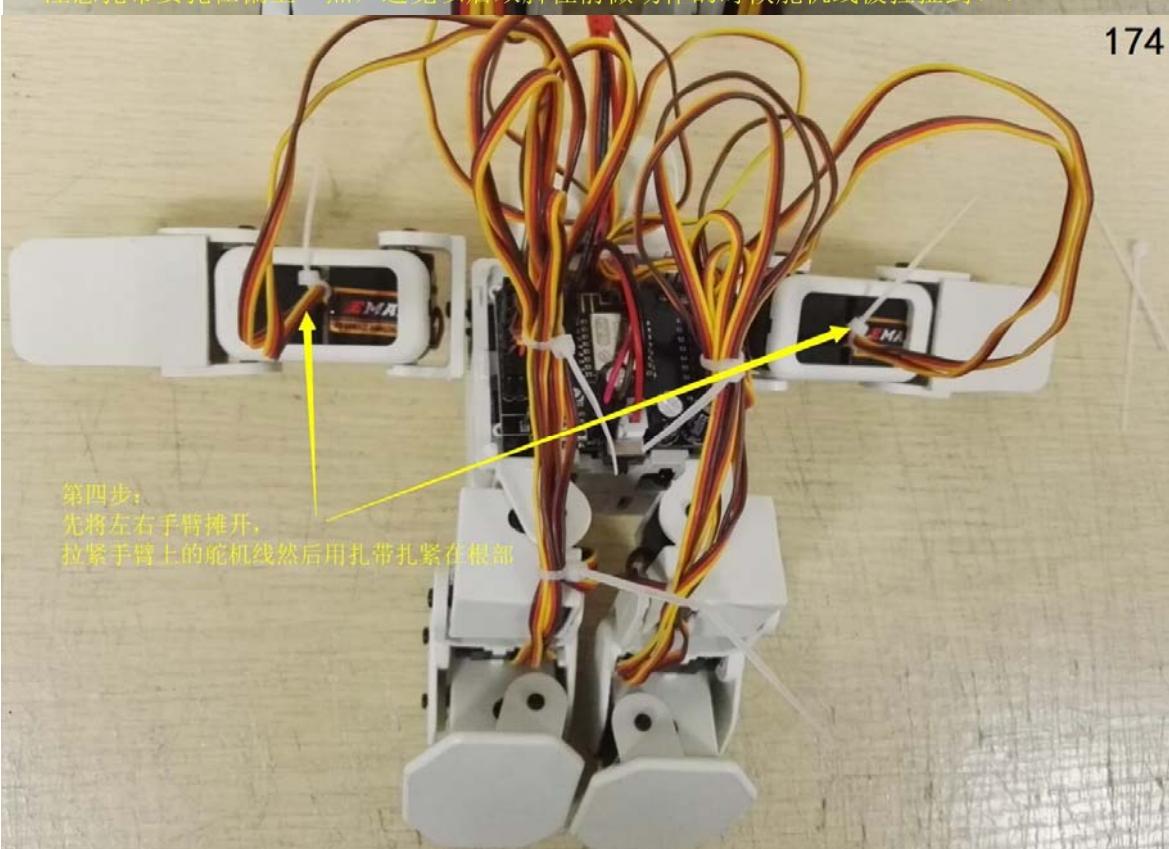
第二步：将左右腿的舵机线如图一样捋直，然后位于“舵机支架(上)”的后边角处用扎带扎紧

173

**第三步：**

双腿的舵机线从控制板的一端同样捋顺后与另一端的线折合与控制板下沿处(偏上一点),同时拉紧双腿处的舵机线,使其贴合双腿的腰部,然后在二者折合处用扎带扎紧。  
注意扎带要扎在偏上一点,避免以后双脚往前做动作的时候舵机线被拉扯到！！

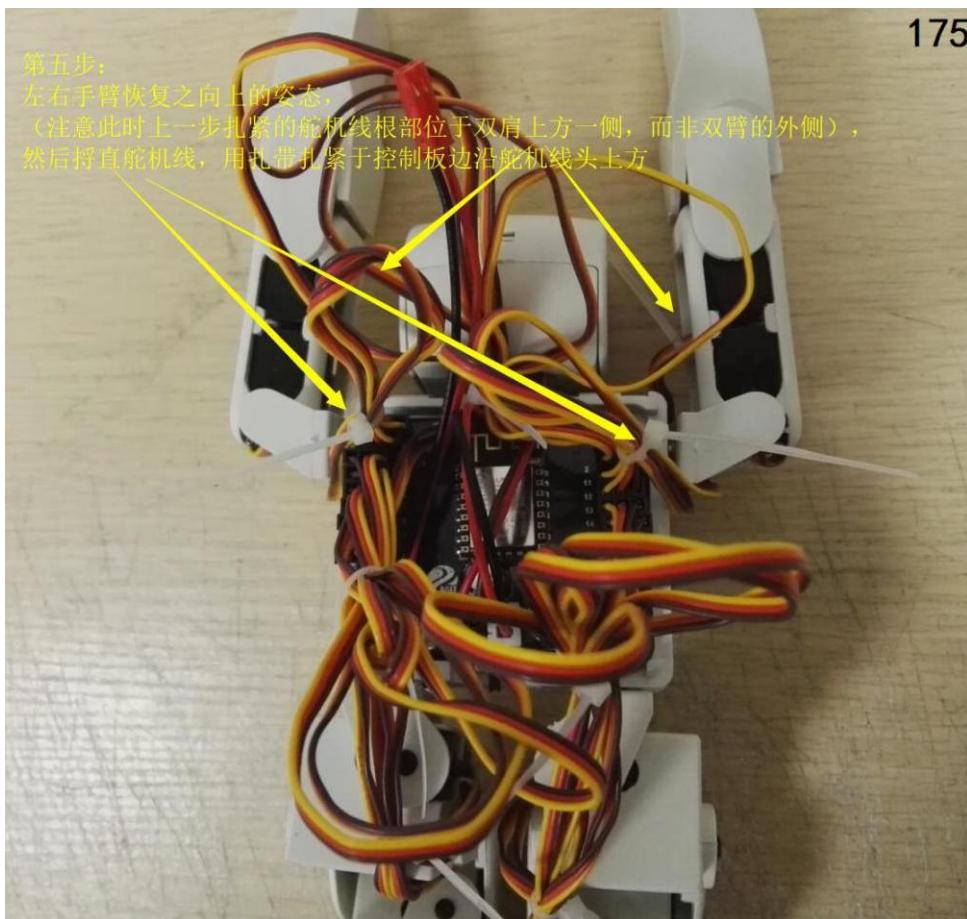
174

**第四步：**

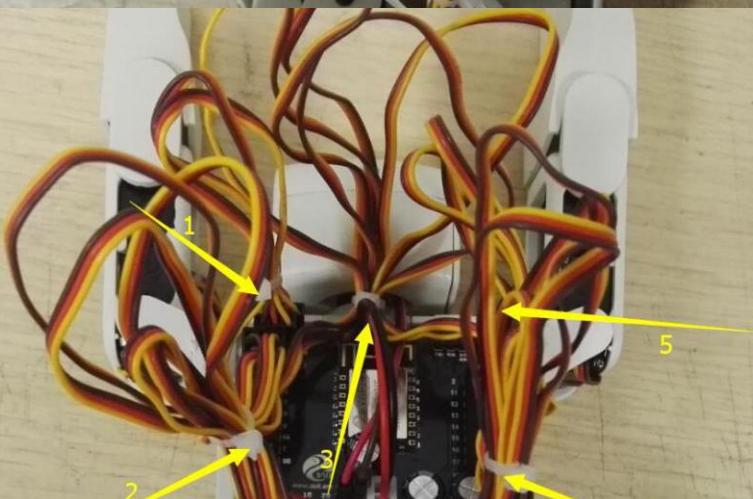
先将左右手臂推开,  
拉紧手臂上的舵机线然后用扎带扎紧在根部

175

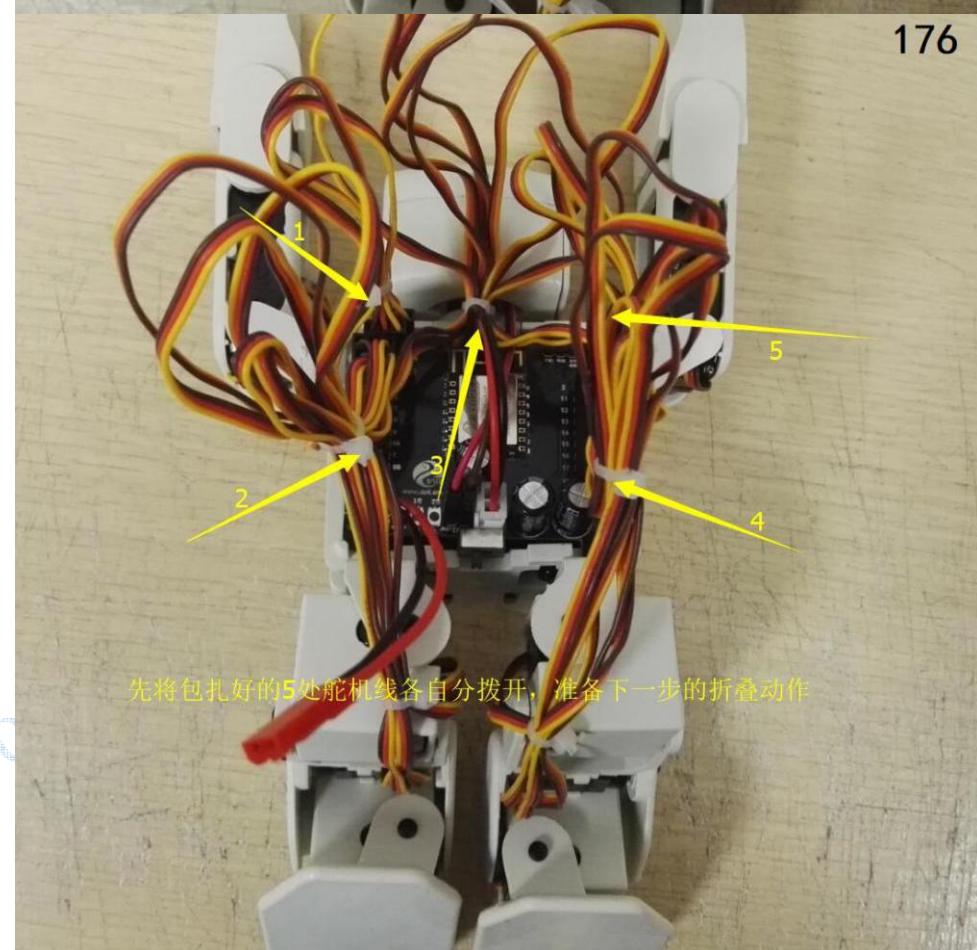
第五步：  
左右手臂恢复之向上的姿态，  
(注意此时上一步扎紧的舵机线根部位于双肩上方一侧，而非双臂的外侧)，  
然后捋直舵机线，用扎带扎紧于控制板边沿舵机线头上方

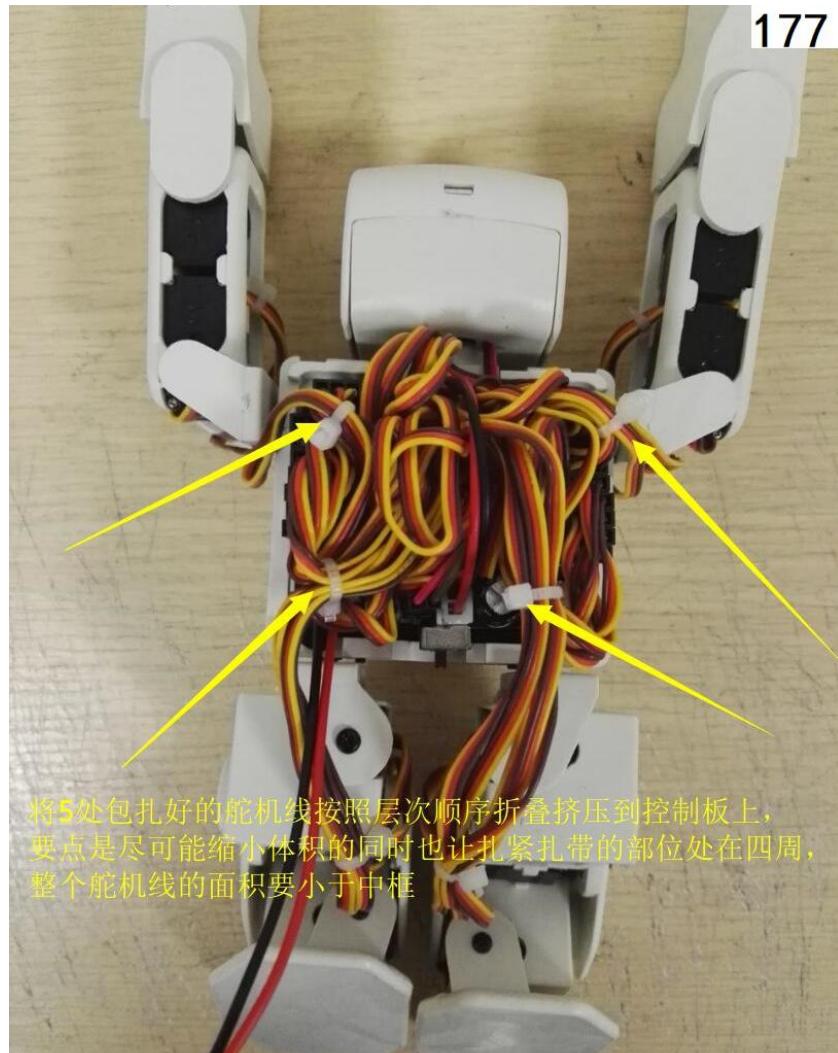


176

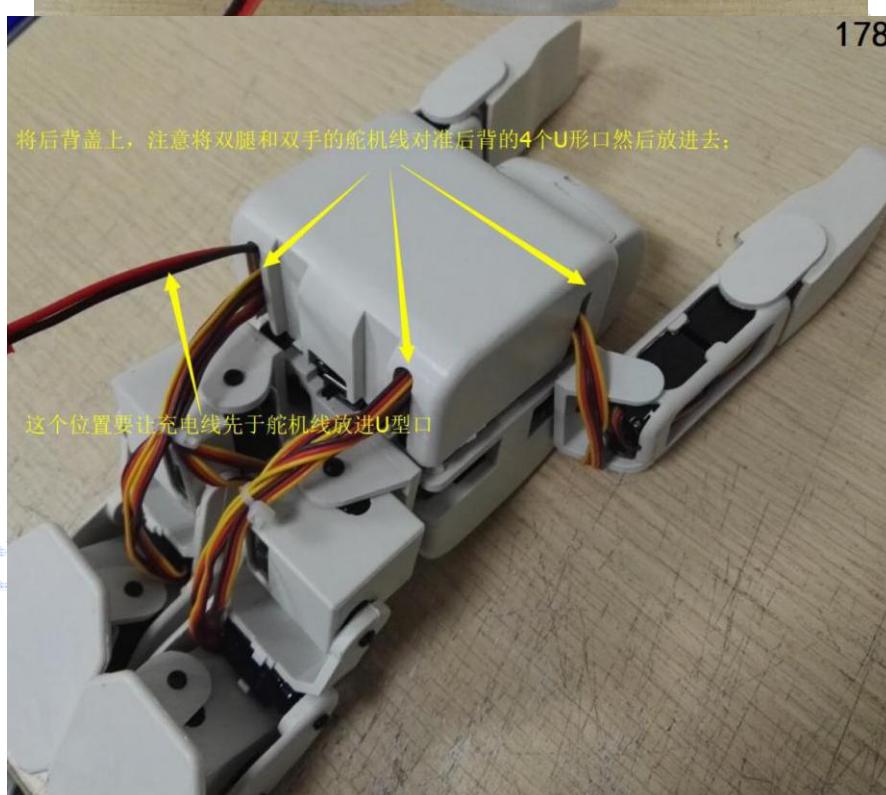


先将包扎好的5处舵机线各自分拨开，准备下一步的折叠动作





将5处包扎好的舵机线按照层次顺序折叠挤压到控制板上，  
要点是尽可能缩小体积的同时也让扎紧扎带的部位处在四周，  
整个舵机线的面积要小于中框



将后背盖上，注意将双腿和双手的舵机线对准后背的4个U形口然后放进去；

这个位置要让充电线先于舵机线放进U型口

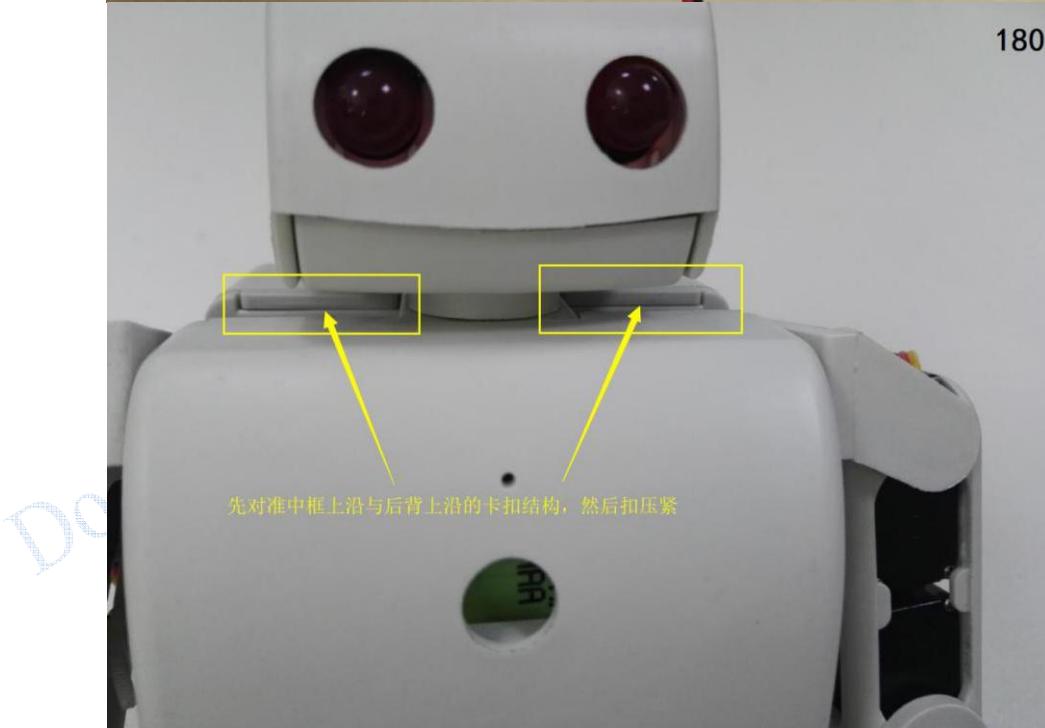
179

左右边的U型口要先放进左右手的舵机线  
(扎带扎紧处位于后背里面)



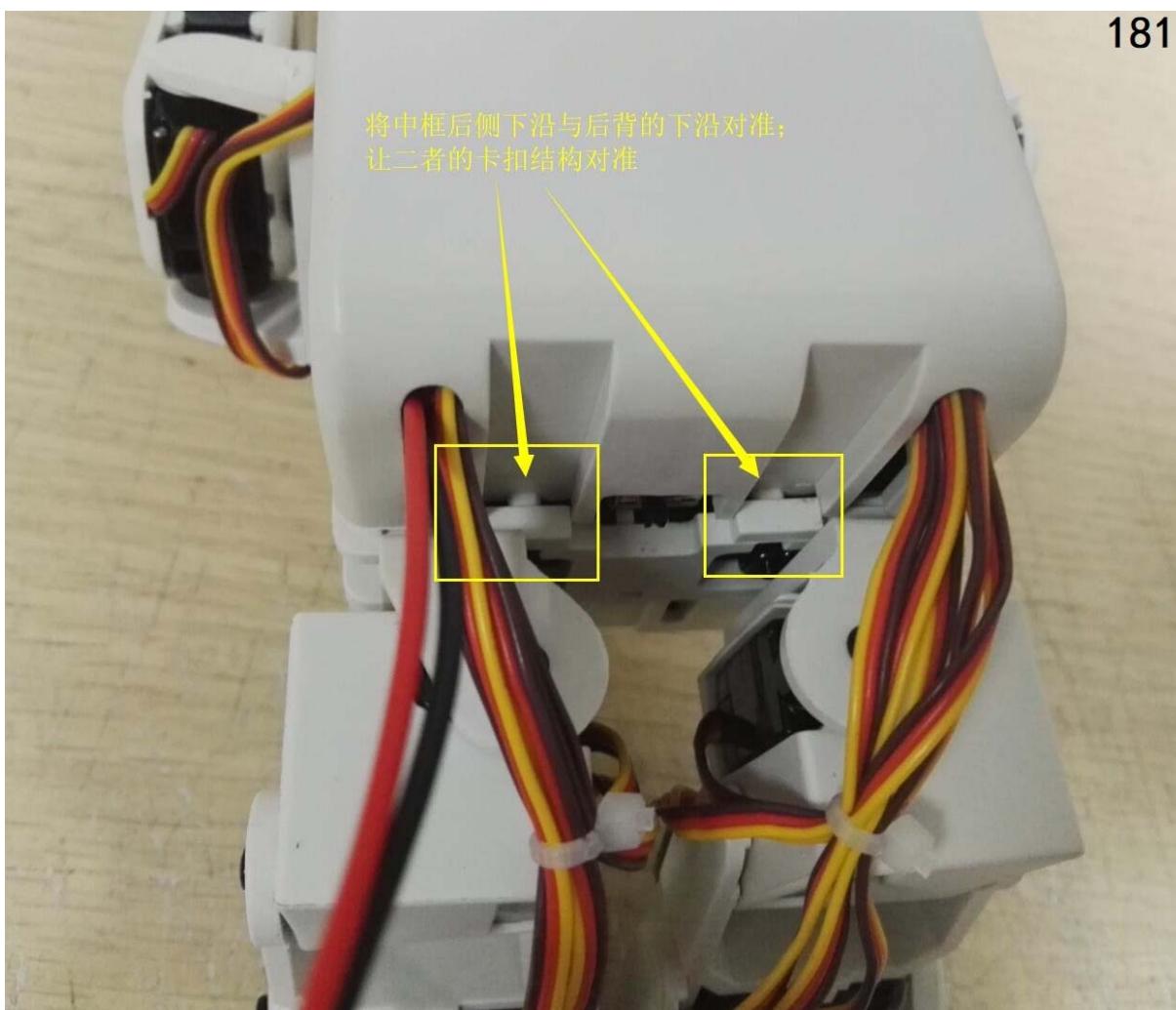
180

先对准中框上沿与后背上沿的卡扣结构，然后扣压紧

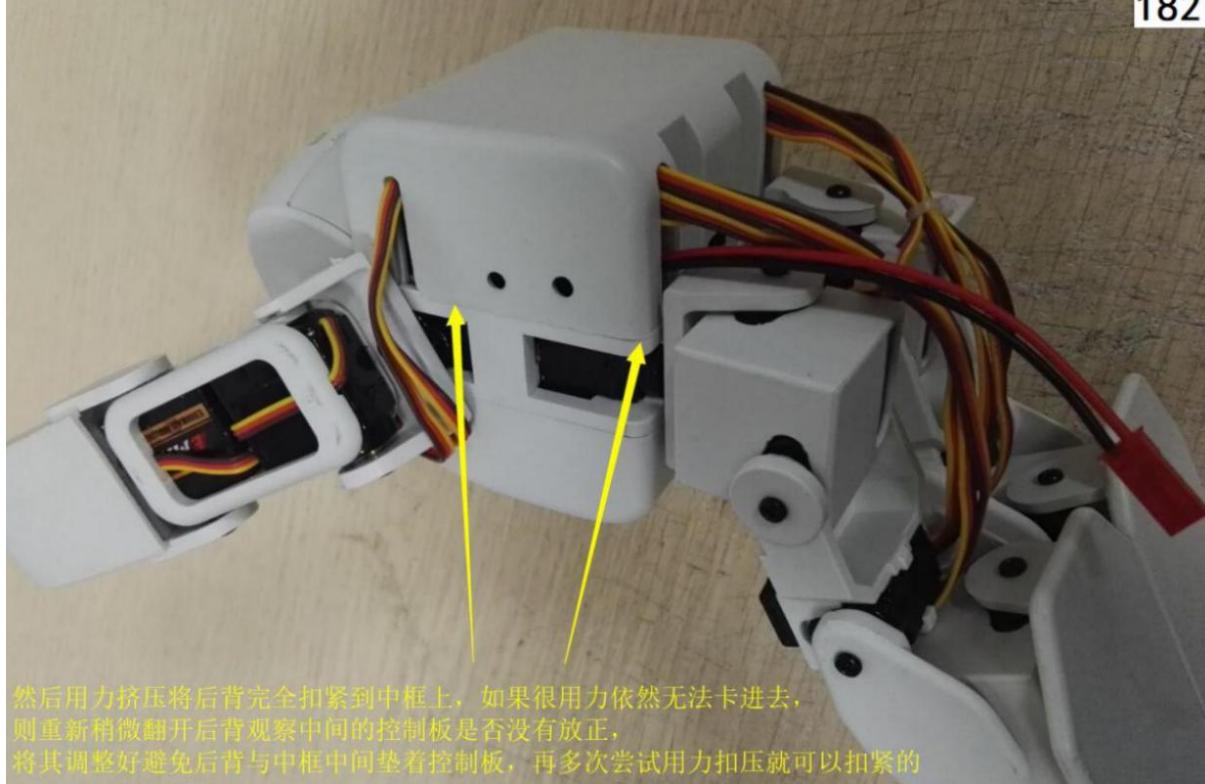


181

将中框后侧下沿与后背的下沿对准；  
让二者的卡扣结构对准



182



然后用力挤压将后背完全扣紧到中框上，如果很用力依然无法卡进去，则重新稍微翻开后背观察中间的控制板是否没有放正，将其调整好避免后背与中框中间垫着控制板，再多次尝试用力扣压就可以扣紧的

完全安装完毕后，  
将双手和双腿旋转回原来的初始状态  
注意是按原路旋转回去，避免缠绕到舵机线



184

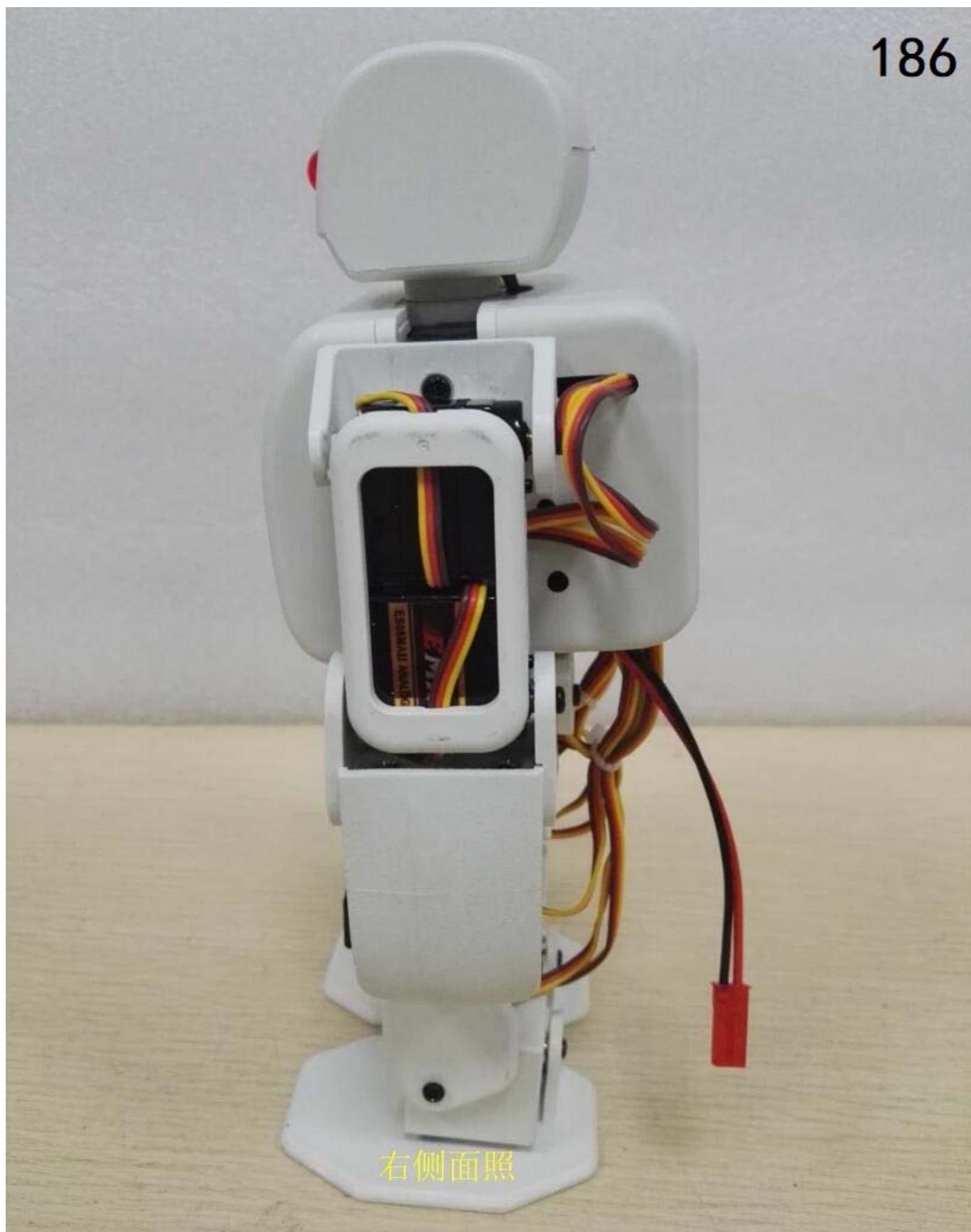
完全安装调试完毕的机器人  
正面照



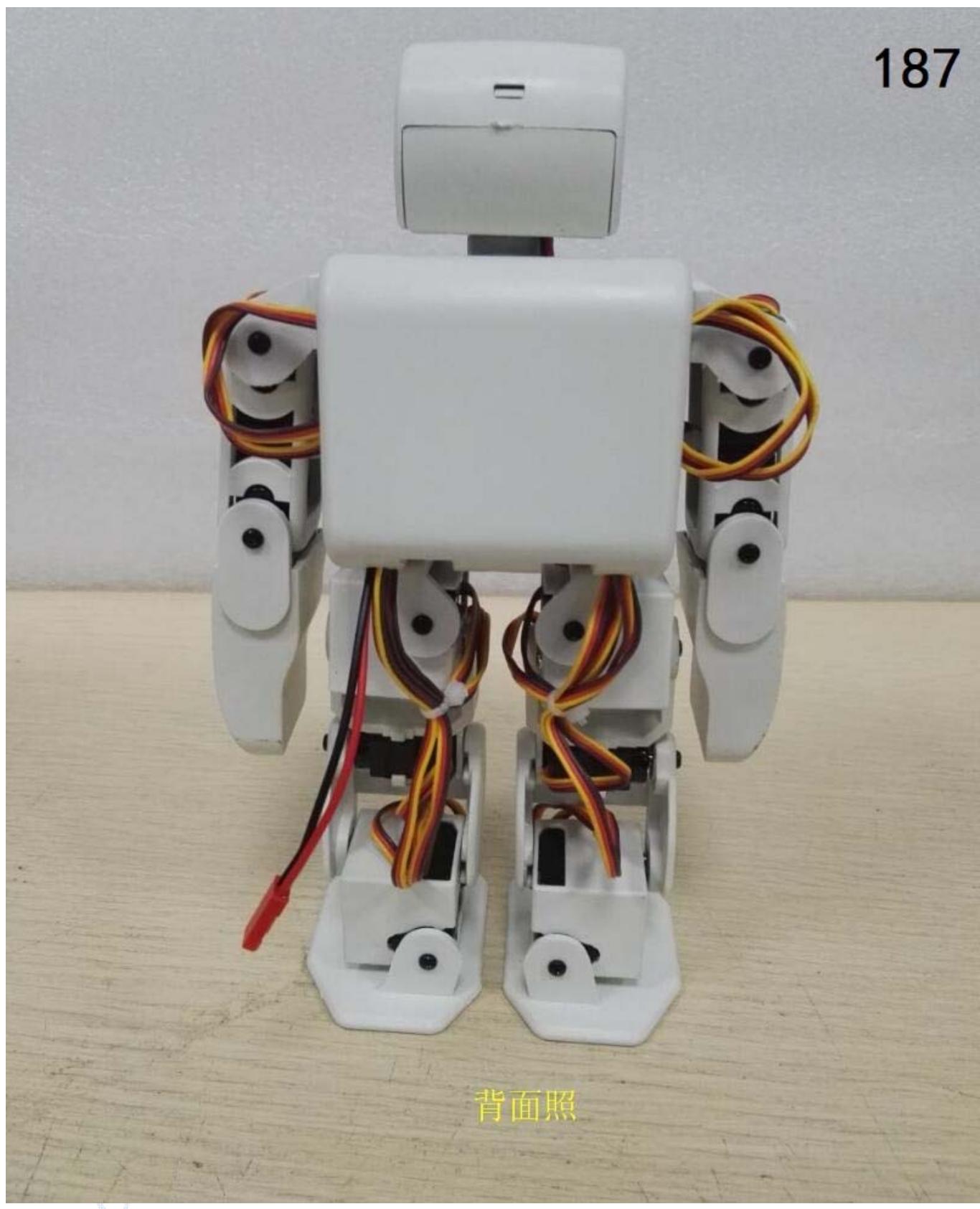
185



186



187



背面照

## 1. Introduction

### Appendix.2

<b>From DOIT</b>	
<b>Official site</b>	<a href="http://www.doit.am">www.doit.am</a>
<b>Chinese book</b>	<a href="#">ESPDuino 智慧物联开发宝典</a>
<b>Online shop</b>	<a href="http://www.smartarduino.com">www.smartarduino.com</a> , <a href="http://www.vvdoit.com">www.vvdoit.com</a>
<b>Forum</b>	<a href="http://wiki.doit.am">wiki.doit.am</a>
<b>IoT Application</b>	<a href="#">智能建筑云</a>
	<a href="#">光伏监控云</a>
	<a href="#">Doit 玩家云</a>
	<a href="#">免费 TCP 公网调试服务</a>
<b>Contact Us</b>	
<b>Emails</b>	<a href="mailto:yichone@doit.am">yichone@doit.am</a>
	<a href="mailto:yichoneyi@163.com">yichoneyi@163.com</a>
<b>Skype</b>	yichone
<b>WhatsApp</b>	<b>008618676662425</b>
<b>WeChat</b>	itchenve
<b>QQ</b>	<b>123433772</b>

<b>From Espressif ESP8266</b>	
<b>Chip</b>	<a href="#">ESP8266 Quick Start Guide</a>
<b>Software</b>	<a href="#">ESP8266 SDK Start Guide</a>
	<a href="#">ESP8266 SDK</a>
<b>Download Tools</b>	<a href="#">ESP8266 Download Tool</a>
<b>Others</b>	<a href="#">ESP8266 Forum</a>
	<a href="#">ESP8266 Resources</a>

# Disclaimer and Copyright Notice

The information in this article, including the URL for reference, if there is any change, without prior notice.

Documents are provided by the current version without any guarantee responsibility, including merchantability, suitable for any particular purpose or non-infringement guarantees, and any guarantees presented by any proposal, specification, or sample mentioned elsewhere. This document has no any responsibility, including the use of the information within this document produced by the infringement of any patent rights. This document in this, by estoppel or otherwise, grant any intellectual property licensing, whether express or implied license.

The Wi-Fi alliance marks shall be owned by the Wi-Fi alliance.

All the mentioned brand names, trademarks and registered trademarks presented in this document are the property of their respective owners, and hereby declare.

## Notice

Because of the product update or other reasons, this manual may change. Doctors of Intelligence & Technology Co., LTD Keeps the right to change the contents of this manual in the absence of any notice or reminders. This manual is used only as a guide, Doctors of Intelligence & Technology Co., LTD would try their best to provide the accurate information in this manual, but it does not ensure that the manual content is completely right and national, all the statements in this manual, and information and advice do not mean to provide any express or implied guarantees.

