

用户手册 USER MANUAL

和孩子造个机器人吧！
Make Robots With Kids!



厦门匠客信息科技有限公司
JornCo Information Technology Co., Ltd.



www.robospace.cc

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机器人百科 Robot Encyclopedia

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1. Robot由来 Robot's origin

1920年 捷克斯洛伐克作家卡雷尔·恰佩克在他的科幻小说中，根据Robota（捷克文，原意为“劳役、苦工”）和Robotnik（波兰文，原意为“工人”），创造出“机器人”这个词。

1. Robot's origin

In 1920, Czechoslovakian author Karel Capek coined the term "Robot" on the basis of Robota (Czech, means "labor, toil") and Robotnik (Polish, means "worker") in his science fiction

2. 古代机器人

三国时期的蜀汉（公元221~263），丞相诸葛亮既是一位军事家，又是一位发明家。他成功地创造出“木牛流马”，可以运送军用物资，可称为最早的陆地军用机器人。

2. Ancient robot

In Shu Han Kingdom during the Three Kingdoms period, the prime minister Zhuge Liang in ancient China was a strategist as well as an inventor. He invented "Wooden Ox and Gliding Horse", known as the earliest military robot in land, which can be used for delivery of military supplies.



3. 第一台家用机器人

1939年 美国纽约世博会展出了西屋电气公司制造的家用机器人Elektro。它由电缆控制，可以行走，会说77个字，甚至可以抽烟，不过离真正干家务活还差得远。但它让人们对于家用机器人的憧憬变得更加具体。

3. The first domestic robot

In 1939, the first domestic robot Elektro from Westinghouse Electric Corp was exhibited in New York's World Expo. Controlled by cable, it was able to walk and speak 77 words. It can even smoke, but still can't do any house work yet. However, it led to people's more concrete longing for domestic robot.

4. 工业机器人的发明

1959年德沃尔与美国发明家约瑟夫·英格伯格联手制造出第一台工业机器人。随后，成立了世界上第一家机器人制造工厂——Unimation公司。由于英格伯格对工业机器人的研发和宣传，他也被称为“工业机器人之父”。

4. The invention of industrial robot

In 1959, American inventor Devor and Joseph Engelberger joined their hands to make the first industrial robot. After then, they set up the first robot manufacturer in the world—Unimation. Because of Engelberger's research, development and publicity of industrial robot, he was called "the father of industrial robot". However, it led to people's more concrete longing for domestic robot.



5. 机器人的分类 Robot's category

工业机器人：面向工业领域的机器人，常见于工厂生产线。
服务机器人：为人们提供服务的机器人，常见于人们生活当中。

5.s category

Industrial robot: used for industrial field and commonly seen in production line. Service robot: serve people and commonly seen in people's life.



6.目前应用最广泛的服务机器人？

扫地机器人

6.The current most widely used service robot?

Sweeping robot

7.目前工业机器人应用最广泛的产业？

汽车制造业



7.The current industry that industrial robot are most widely used ?

Motor industry



8.机器人三法则

科幻小说作家艾萨克·阿西莫夫在其小说当中，首次提出了机器人三法则：

第一法则：机器人不得伤害人类，或坐视人类受到伤害；
第二法则：除非违背第一法则，机器人必须服从人类的命令；
第三法则：在不违背第一及第二法则下，机器人必须保护自己。

8.Three laws of robotics

Science-fiction writer Isaac Asimov first put forward Three Laws of Robotics in his work:

The First Law: A robot may not injure a human being or, through inaction, allow a human being to come to harm.

The Second law: A robot must obey the orders given by human beings except where such orders would conflict with the First Law.

The Third law: A robot must protect its own existence as long as such protection does not conflict with the First or Second Laws.

9.初代工业机器人

工程师通过编程、数学方式，设计工业机器人的动作轨迹。在独立开后，使得工业机器人能够按照预先编排的程序运行。



9.The early generation of robots

Engineers apply programming, teaching methods to design industrial robot's Motion locus, so that industrial robot can run independently according to the preset well-orchestrated program



10.近代工业机器人

近代智能工业机器人不仅具有获取外部环境信息的各种传感器，而且还具有记忆能力、语言理解能力、图像识别能力、推理判断能力等人工智能，这些都是微电子技术的应用，特别是计算机技术的应用密切相关。

10.Modern industrial robot

The modern intelligent industrial robot has not only various sensors for getting external environment information, but also artificial intelligence such as memory, verbal comprehension, image recognition, inferring and judging abilities, etc. These are applies of micro electronic technique, especially are closely related to computer technology.

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11.工业机器人组成结构

主体：机座和执行机构，包括臂部、腕部和手部，有的机器人还有行走机构；
驱动系统：动力装置和传动机构，用以使执行机构产生相应的动作；
控制系统：按照输入的程序对驱动系统和执行机构发出指令信号，并进行控制



11.Composition and structure of industrial robot

Subject: engine base and actuator, including arm, wrist and hand. Some robots even have running gear.

Driving system: powerplant and transmission mechanism, which make actuator do relevant action.

Control system: giving order signals to driving system and actuator according to input routine and control them.

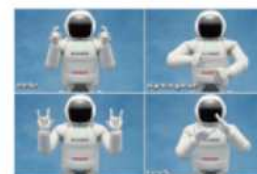
12.工业机器人四大家族

瑞士ABB、德国库卡、日本发那科、日本安川电机



12.The big four of industrial robot

ABB in Switzerland, Kuka in German, Fanuc in Japan and Yaskawa Electric in Japan



13.类人机器人

人类：当希望创造出和人类构造相似，能与人类合作的类人型机器人，类人机器人是一种具有人的外形，并能够模仿人体的某些物理功能、感知系统及社交能力，并能承载人类部分经验的机器人。

13.Humanoid robot

People always want to create humanoid robot that has similar structure as human being and can also cooperate with them. Humanoid robot is a kind of robot that has human's appearance, can imitate human's some physical functions and sociability, and can also adopt people's some experience.

14.类人机器人的特点

类人机器人的典型特点是机器人的下肢以刚性构件通过转动副联接，模仿人类的腿、髋关节、膝关节、和踝关节，并以执行装置替代肌肉实现对人体的支撑及连续地协调运动，实现双足行走。因双腿直立行走是人类特有的步行方式，故仿人行走是机器人行走方式中自动化程度最高、最为复杂的动态系统。

14.Humanoid robot's characteristics

Humanoid robot's typical characteristic is that its legs is connected by rigid member by revolute pair and imitate human's legs, hip joint, knee joint and ankle joint, using executive device to replace muscle to support body and continuously coordinate exercise for biped walking.



15.人工智能

人工智能是研究、开发用于模拟、延伸和扩展人的智能的理论、方法、技术及应用系统的一门新的技术科学。该领域的研究包括语言识别、图像识别、自然语言处理等。人工智能从诞生以来，理论和技术日益成熟，应用领域也不断扩大，可以设想，未来人工智能带来的科技产品，将会是人类智慧的“容器”。

15.Artificial intelligence(AI)

Artificial intelligence is a new technical science that studies and develops the theory, method, technology or application system to simulate, extend human's intelligence. Its research field consists of speech recognition, image identification and natural language processing, etc. Since its birth, theory and technology of artificial intelligence increasingly mature, and application field continuously extend. Thus, it's easy for us to imagine that the sci-tech products brought by future artificial intelligence will be the "container" of human's wisdom.

16.AlphaGo称霸围棋棋坛

它的设计者不懂围棋！阿尔法狗就是用几个月的时间，模拟了人类几百万年的智力进化，以及围棋棋式的几百年进化历程，优胜劣汰，形成的自己的棋风。可不是打人类的谱学的！全人类几百年来下过的全部棋谱，对它来说“学习”分析一遍只需要几天时间而已。

16.AlphaGo dominates Go field.

His designer doesn't know Go(a board game)! AlphaGo just spent a few months to simulate human's intellectual progress in millions of years and go game moves evolution in hundreds of years, then he selected the superior and eliminated the inferior and finally develop its own playing style. He didn't learn by playing human's playing manuals! Because it only costs several days for him to "learn" and "analyze" all human's playing manuals for hundreds of years.



17.图灵测试

图灵测试一词来源于计算机科学和密码学先驱阿兰·图灵（Alan Turing）于1950年的论文《计算机与智能》。图灵认为，如果一台机器能够与人类展开对话而不能被辨别出其机器身份，那么这台机器就具备了智能。尽管图灵的方法因为过于简单而受到许多人批评，但其依然对人类有关人工智能的思考产生巨大影响。

17.Turing test

Turing Test is derived from a thesis named "Computing Machinery and Intelligence", which was written by Alan Turing, a pioneer of computer science and cryptology. Turing believed that if a machine can communicate with human beings and he is not detected as a machine, then he has intelligence. Although Turing's test way is so simply that it is criticized by many people, it still has a great effect on human's cognition for artificial intelligence.

18.人工智能的未来

谷歌CEO认为，人工智能将会在人类未来社会中扮演重要角色，而且势必引起两个变化：

1. 大部分工人的工作被人工智能取代(约90%)，而这些工作往往并不是他们原先想要去做的事情(仅仅是为了养家糊口)。
2. 人工智能会让生活成本大大降低，人们可以过的比以前更舒适，去追求自己的梦想，做自己想做的事情。在未来，越来越多的工作要求创造性智慧、社交技能和利用人工智能技术的能力。



18.The future of artificial intelligence

Google's CEO believes that it will play an important role for artificial intelligence (AI) in human's future society so that it will lead two changes.

1. Most of workers are replaced by AI (about 90%) and these work they often dislike (just for supporting family).
2. AI will reduce life cost a lot, so people can live a better life than before and to pursue their ideal life. In the future, an increasing number of jobs request people's creative intelligence, social skills and ability to use AI.



DISCOVER
TOMORROW

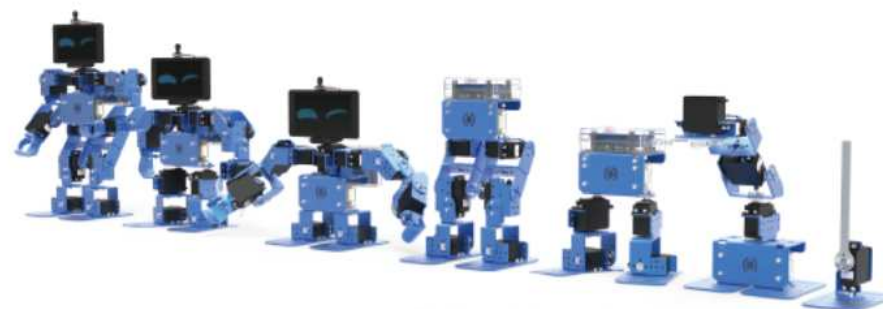
19.2020奥运会的机器人

对于有着浓厚机器人情结的日本来说，2020奥运会将会是机器人大行其道的一届奥运会，而且机器人在这届奥运会的应用可能是超过我们的想象的登峰造极。

19.Olympian robot in 2020

For Japan, a country has a robot complexe, its 2020 Olympic Game will fully make use of robots, and the application of robots for this Olympic Game may be beyond our imagination.

【第一节】什么是IronBot Chapter I What is IronBot?



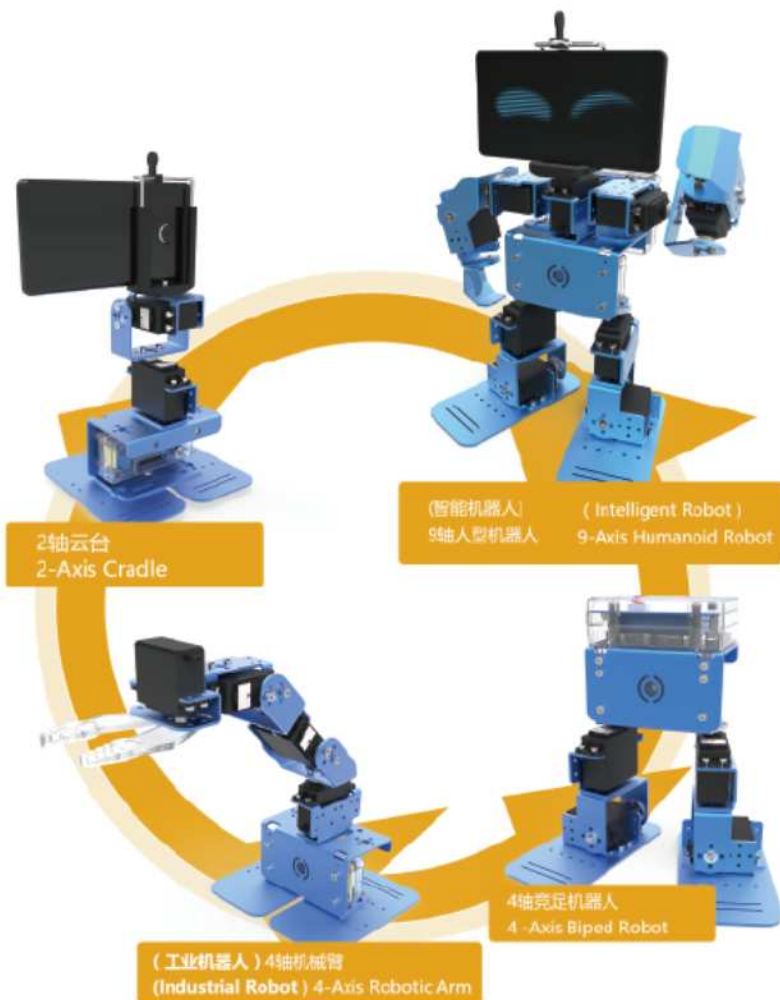
IronBot可组装成各形态的机器人
IronBot can be assembled into robots in different shapes.

IronBot是一款儿童机器人学习套件，可组装出机械臂、竞足、人型等各形态的机器人，还可将手机直接作为机器人的大脑与控制器，拥有语音视觉互动、图形化编程、个性设定等功能。从工业机器人到智能机器人，将结构、电子、计算机知识与机器人的相结合，让孩子在边学边玩中收获STEM知识，打开通往未来机器人世界的大门！

As a kind of kid robot-learning kit, IronBot can be assembled into robots in different shapes, such as Manipulator, Biped Robot and Humanoid Robot; meanwhile, it is also available to control robot's brain with the functions of audio-visual interaction, graphical programming and personalized setting. The combination of structure, electronics, computer knowledge and robot enabled children to acquire STEM knowledge during entertainment and carve out the road to future robot!



零件模块



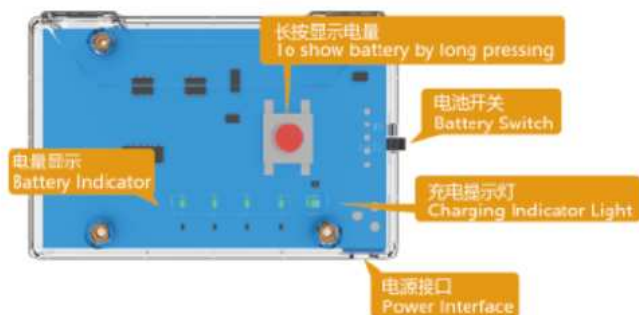
IronBot作为一款机器人启蒙DIY套件，在DIY过程当中相较于普通玩具，具有一定难度，可以说目前21世纪最先进的机器人技术，在IronBot当中都有所体现！所以请大家，还有我们的爸爸妈妈们，一定要保持积极耐心的探索精神，一起发现问题、解决问题！接下来，就请大家开启机器人之旅吧！

IronBot as a robot Enlightenment DIY package, in the DIY process which compared to ordinary toys, has a certain difficulty, we can say that the 21st century, the most advanced robot technology, which are reflected in IronBot! So please, as well as parents, we must maintain the spirit of active and patient exploration, with the discovery of problems and solve the problem! Next, please enjoy the robot journey!

控制器 Electronic Controller



电池模块 Battery Module



舵机 Servo



04

Part List

名称	图样/数量	名称	图样/数量
控制器 Electronic Controller x1		主件 Main Component x1	
舵机 Servo x10		U型件 U-shape Component x2	
电池模块 Battery Module x1		斜U型件 Inclined U-shape Component x2	
电源适配器 Power Adapter x1		舵机件 Servo Component x9	
手机夹 Phone Stand x1		L型件 L-shape Component x5	
亚克力爪 Claw x1		左/右手 Left and right hands x2	

05

Part List

名称	图样/数量	名称	图样/数量
转轴件 Axis of Rotation x1		平面件 Flat Component x2	
轴承 Bearings x5		金属舵盘 Rudder Disc x9	
螺丝M3*4mm Screws x12		螺丝M3*5mm Screws x130	
螺丝M3*8mm Screws x15		螺丝M3*12mm Screws x1	
六角螺丝刀 Screwdriver x1		金属垫片 Gaskets x2	
电源线 Power Cable x1		延长线 Extension Cord x2	
螺母 M3 Nuts x8			

06

【第三节】 组装技巧 Chapter III Assembly Skills

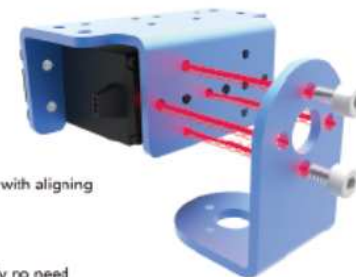
舵机安装 Servo Assembly

1. 结构件主要采用了4孔对齐的组装标准方式

1. The structural components mainly adopt standard assembly pattern with aligning 4 holes.

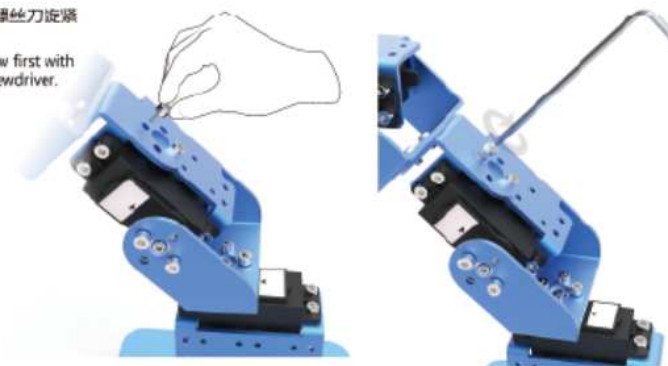
2. 在4孔当中，装入2个螺丝就足够稳固，不需要用到4个

2. Installing 2 screws into the 4 holes can achieve steadiness, so actually no need 4 screws.



3. 螺丝可先用手旋住，后用螺丝刀旋紧

3. It is available to rotate screw first with hands and then fasten by screwdriver.



请勿将螺丝歪着旋

4. Please never rotate screws by tilting.



07

4.1、启动机器人 Turn on Robot

• 电池供电方式

使用电源连接线，连接电池模块和控制器的电源接口

• Battery Power Supply Mode

To connect Battery Module and the power interface of Controller with power cable.



电池供电 Battery Power Supply

• 电源适配器供电

请在需要长时间使用机器人的情况下使用

Please use power adapter when using Robot for a long time.



电源适配器供电 Power Adapter Supply

• 启动机器人时，请确认两个开关都已开启

• When turn on the Robot, please make sure that both controller switch and battery switch are turned on.



4.2、初始位置 Initial Position

• 当机器人电源打开启动后，机器人将会跳转到初始位置，其中每一个舵机关节都会处于0位状态。（电源开启时注意机器人的运动轨迹，以防碰撞）

• When powering on, the Robot will skip to the initial position as shown in the picture, and each servo switch will be in initial position. (When powering on, pay attention to the movement path of Robot in case of bumping)



正面 Front View



侧面 Lateral View

4.3、充电 Charging

• 将电池开关拨到OUT档，电源口插入电源适配器，即可为电池模块充电。

• 充电中，充电指示灯显示绿色，充电完成时，充电指示灯显示蓝色。

• 将电池开关拨至IN，长按电量显示键，将显示电池电量。

• By adjusting battery switch of gear OUT, and inserting power adapter into power interface then you can charge battery module

• the charging indicator light is turn GREEN when in charging and it will turns into BLUE when finishing.

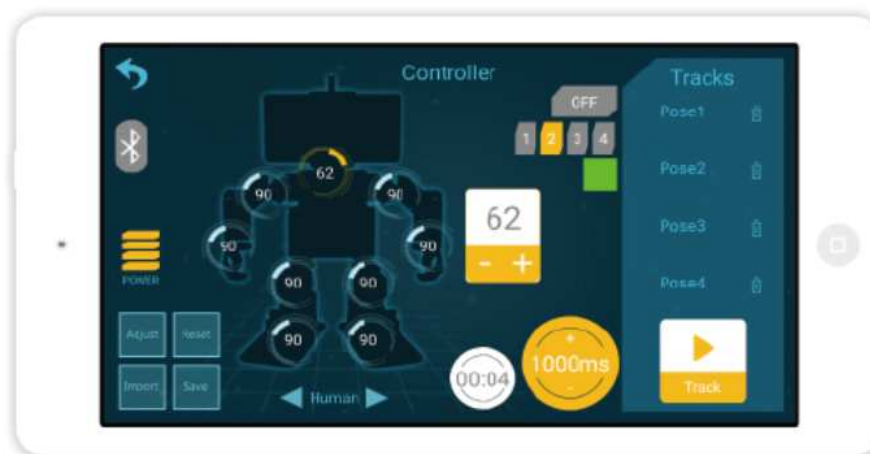
• When adjusting battery switch to IN and long pressing the button of electric quantity display, it will show battery indicator.



4.4、操控机器人 Control Robot

• IronBot机器人使用手机蓝牙操控机器人以及对机器人编程，请查看 www.robospace.cc ,或可直接在IOS的应用商店中，下载APP【IronBot】

• IronBot Robot applies phone Bluetooth to control and program robot; please view www.robospace.cc ,or download the APP【IronBot】 in the Appstore.



控制器操作界面
Controller Operation Interface

4.5、机器人编程 Robot Programming

- 使用APP当中的XLink图形化编程工具，还可对智能机器人的思维逻辑，进行编程控制，打造自己独一无二的智能伙伴！
- By using the XLink graphic programming in APP to program and control the thinking logic of Robot so as to create your unique smart partner!



XLink 图形化编程界面
XLink Graphical Programming Interface

【第五节】常见问题 Chapter V Q&A

问 机器人个别关节不能正常工作，或者舵机转动时发出异响响声？

答 当出现个别舵机不能工作时，请检查相关舵机连线方向是否正确，以及电池电量是否充足。

当出现舵机转动出现异响时，属于舵机内部齿轮出现损坏，切勿用力掰动舵机，请尽快联系更换。

问 机器人启动后不能复位？

答 请检查相关舵机连线方向是否正确，以及电池电量是否充足。

问 APP控制器无法控制机器人？

答 请检查蓝牙是否正常连接，当出现蓝牙连接正常情况下，仍然无法控制机器人时，请重新启动机器人以及手机蓝牙。

问 机器人能对话但是身子不会动？

答 请检查蓝牙是否正常连接，以及电池电量是否充足，或重新启动手机蓝牙以及APP。

问 机器人动作不顺畅？

答 请检查电池电量是否充足，或重新启动机器人及APP。

Q Several joints of the Robot cannot work normally, or there is abnormal noise during the rotation of servo.

A When several servos cannot work, please check whether the connection of relevant servos are correct and battery is in sufficient electric quantity.

The abnormal noise during the rotation of servo belongs to damage inside wheel gear. Please contact for replacement as soon as possible rather than moving servo with hands.

Q It is unable to reset the Robot after starting it.

A Please check whether the connection direction of relevant servo is correct and battery is in sufficient electric quantity.

Q APP controller cannot control the Robot.

A Please check whether the Bluetooth is in correct connection; please restart Robot and phone Bluetooth if it is still unable to control Robot although Bluetooth is in correct connection.

Q It is able to make conversation with Robot while its body does not move.

A Please check whether the Bluetooth is in correct connection and battery is in sufficient electric quantity, or restart phone Bluetooth and APP.

Q Robot action is not in smooth.

A Please check whether battery is in sufficient electric quantity; or restart Robot and APP.

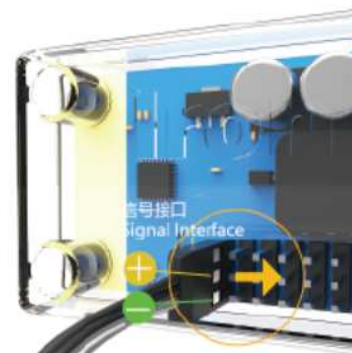
【第六节】基本组装说明 Chapter VI Basic Assembly Instructions

6.1、舵机接线与归位

舵机连接控制器（注意接线方式），控制器接上电源，打开开关；

6.1、Servo Connection and Resetting

Connect servo to controller (pay attention to connecting method); connect controller to power supply and turn on the switch;



连线细节白色点线 - 线朝外
Connecting details: white dotted line - the line shall be outward



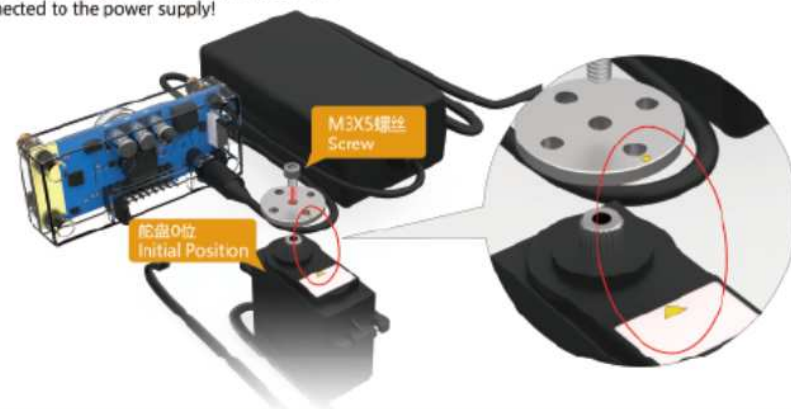
连接正确后，舵机会转动至0位
Disc is back to initial position

6.2、舵盘组装

舵盘组装，可以按照本节方法进行组装。在组装前，请确认舵机已接入电源、归位！

6.2、Rudder Disc Assembly

Before assembling, make sure that the servo is connected to the power supply!



6.3、舵机甲安装

根据舵机甲的安装方向不同，舵机分为A型和B型两种形式

6.3、Assembly of Servo Shell

According to the different assembling directions of servo shell, servo is divided into type A and type B



A型和B型是对称的，A型、B型数量比例不同组装方式有所不同，比如9轴人形机器人A型：B型=4:4

Type A and type B are symmetric, but their assembling modes are different due to distinguishing quantitative proportions; such as a-axis humanoid Robot type A:B=4:4



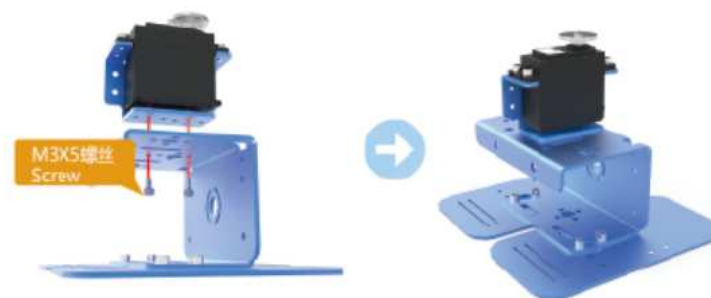
7.1、底座安装

Pedestal Assembly



7.2、2号舵机安装

Assembly of Servo No.2



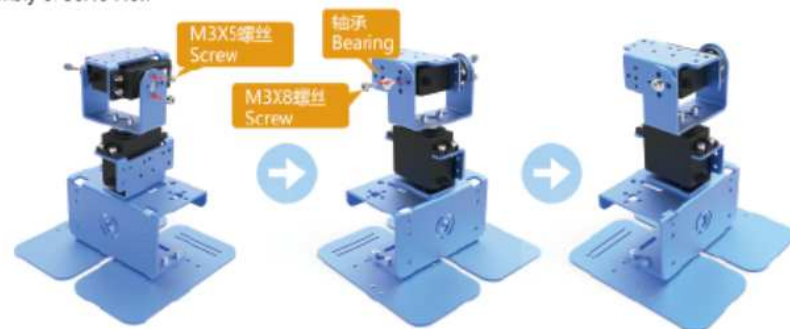
7.3、U型结构安装

Assembly of U-shape Structure



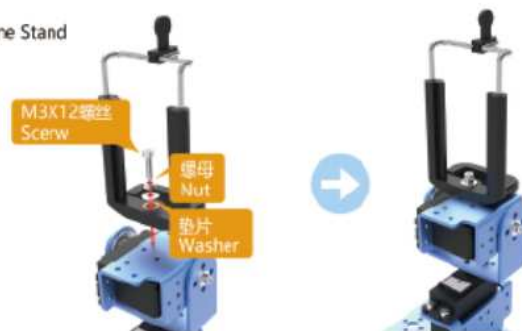
7.4、1号舵机安装

Assembly of Servo No.1



7.5、手机夹安装

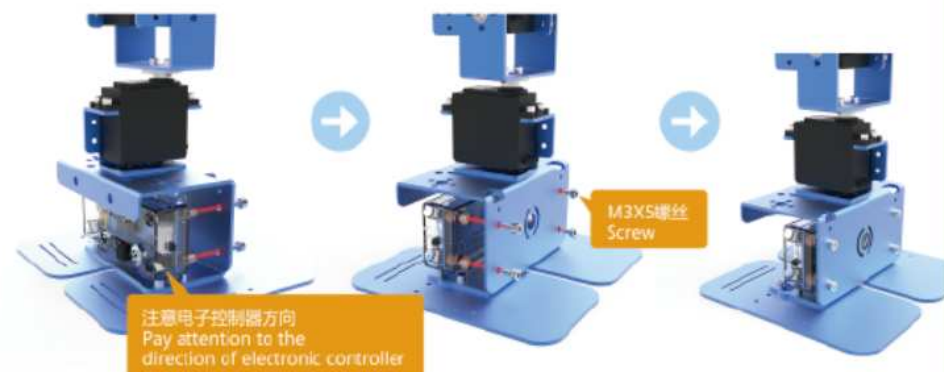
Assembly of Phone Stand



【第七节】2轴云台 Chapter VII 2-Axis Cradle

7.6、电子控制器安装

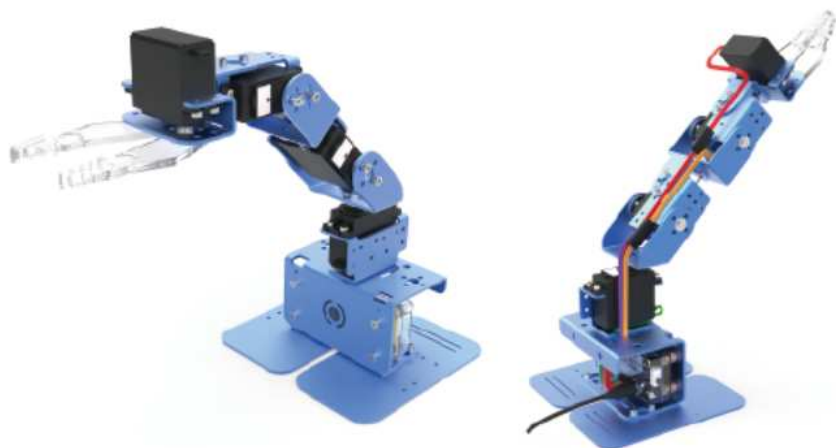
Assembly of Electronic Controller



7.7、接线 Connection



组装完成!
Finish Assembly



8.1. 底座组装，可先用手旋住，后用螺丝刀旋紧

For the assembly of pedestal, it is available to rotate screw first with hands and then faster by screwdriver.



8.2. 4号舵机组装

Assembly of Servo No.4



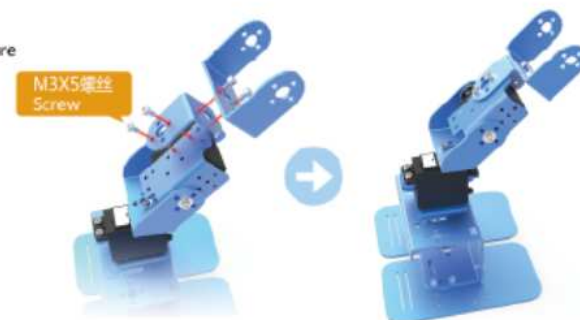
8.3. 3号舵机组装

Assembly of Servo No. 3



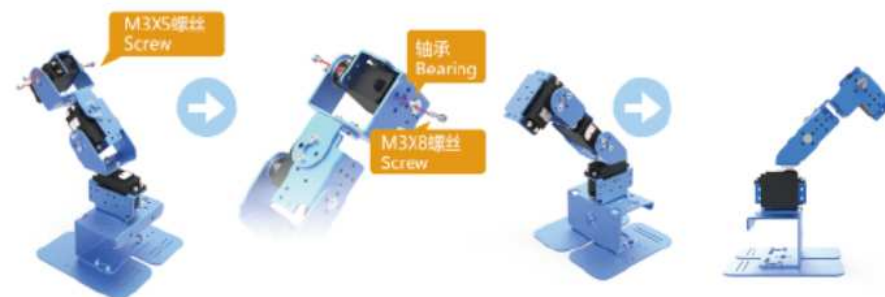
8.4. U型结构组装

Assembly of U-shape Structure



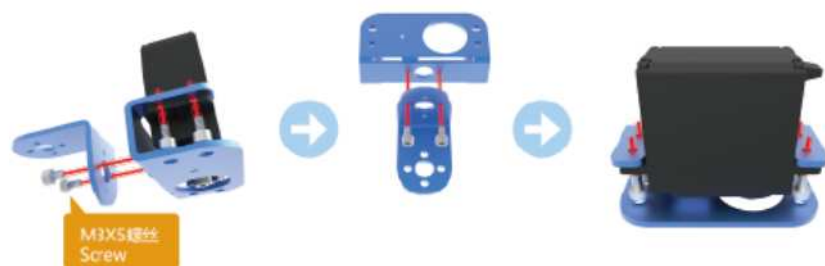
8.5. 2号舵机组装

Assembly of Servo No. 2



8.6. 机械爪固定部组装

Assembly of Robotic Paw Fixing Components



8.7. 机械爪组装

Assembly of Robotic Paw

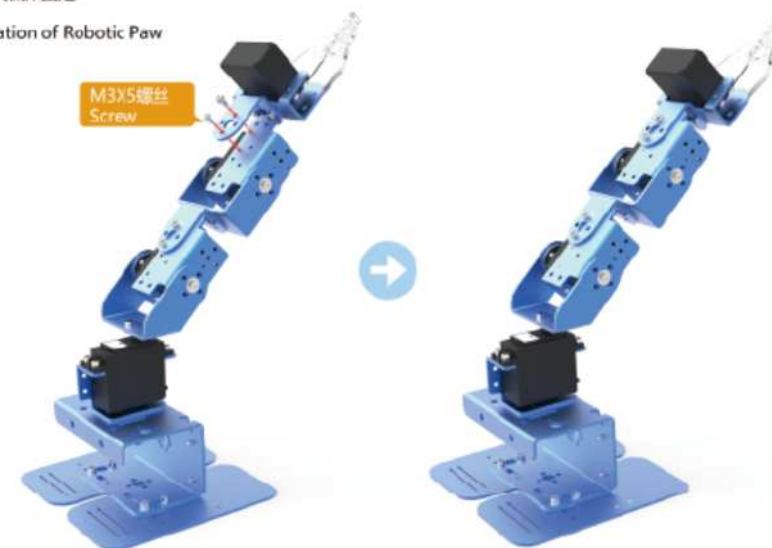


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【第八节】4轴机械臂 Chapter VIII 4-Axis Robotic Arm

8.8. 将机械爪固定

Fixation of Robotic Paw



8.9. 固定电子控制器

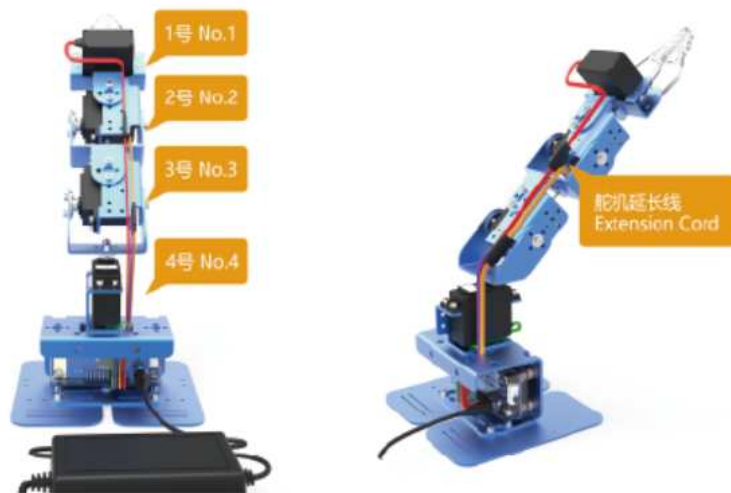
Fixation of Electronic Controller



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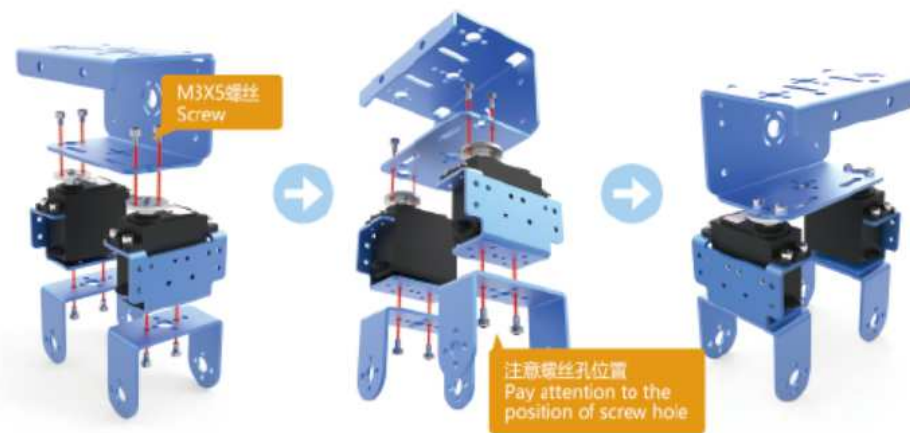
8.10. 机械臂接线说明

Connection Instruction of Robotic Arm



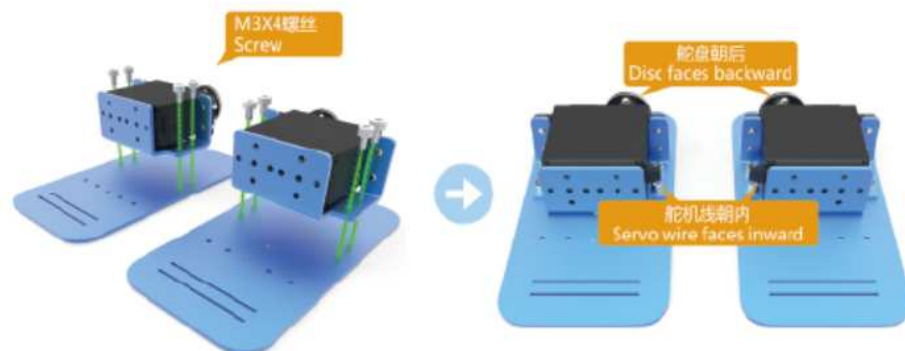
9.1. 腿部安装，A、B型舵机各一个

Legs Assembly : one servo for each type A and B



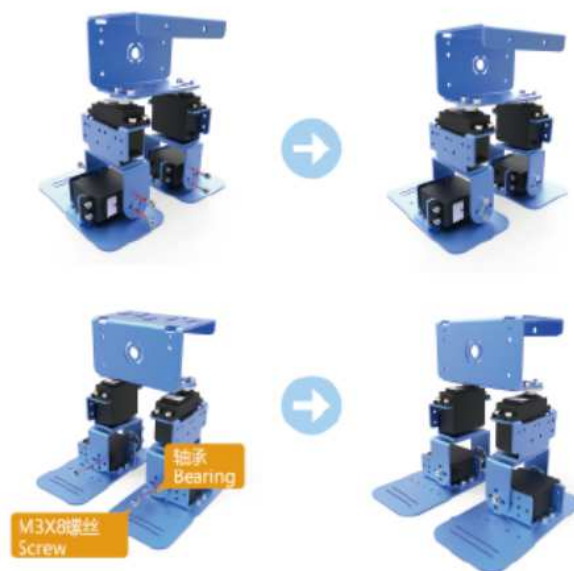
9.2. 脚部安装, A、B型舵机各一个

Feet Assembly : one servo type A and B each



9.3. 脚步与腿部固定连接

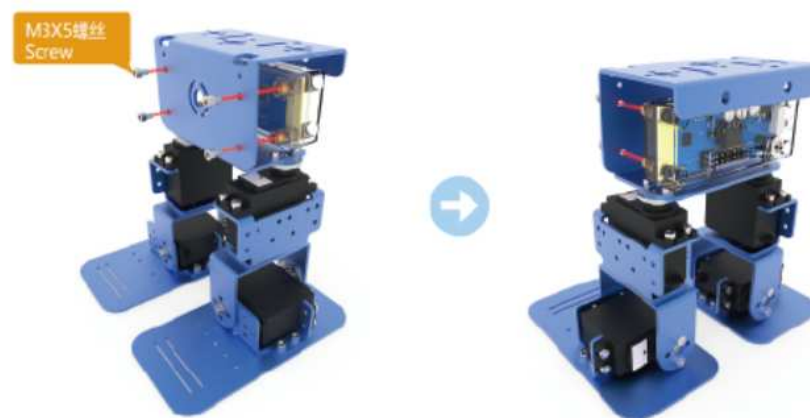
Fixation and Connection of Feet and Legs



第九节 4轴竞足机器人

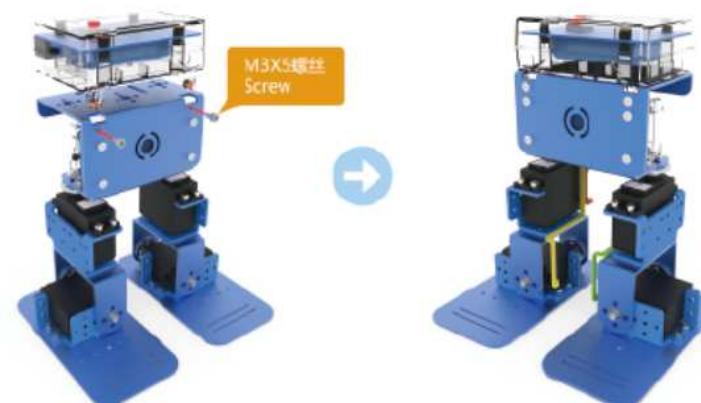
9.4. 固定电子控制器

Fixation of Electronic Controller



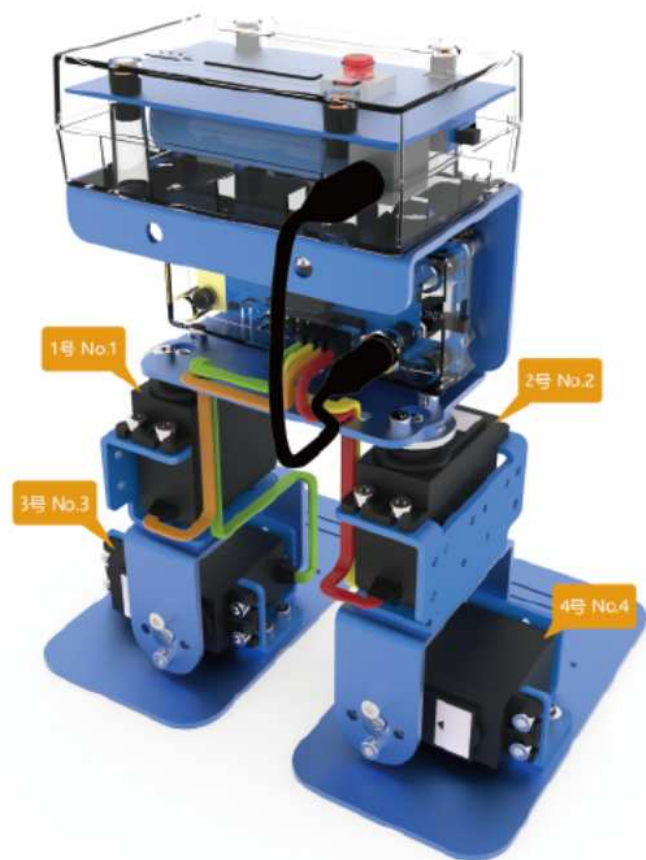
9.5. 电池模块固定

Fixation of Battery Module



9.6、接线说明，按照舵机编号，将线穿过穿孔后，接入控制器1-4号接口

Connection instruction; connect wires to controller interfaces 1-4 after threading holes according to servo numbers.

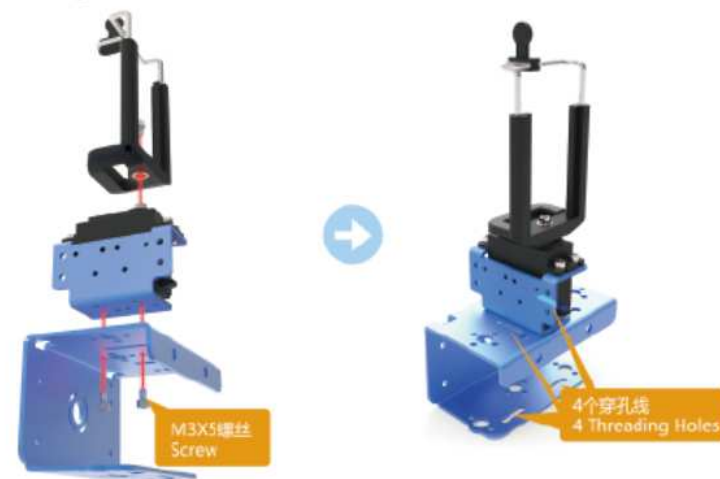


组装完成
Finish Assembly



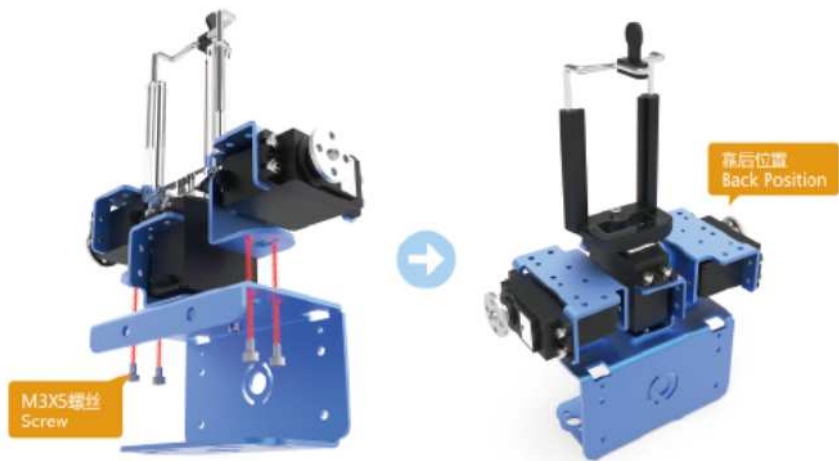
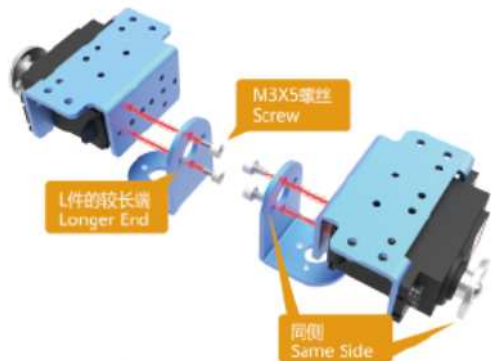
10.1、头部安装

Head Assembly



10.2. 肩膀安装，分别取A型，B型舵机各一个，及L型连接件2个

Shoulder assembly; take one servo in type A and B each, and two L-shape connecting pieces.



10.3. 手臂安装，组装是请确认舵机是否处于0位

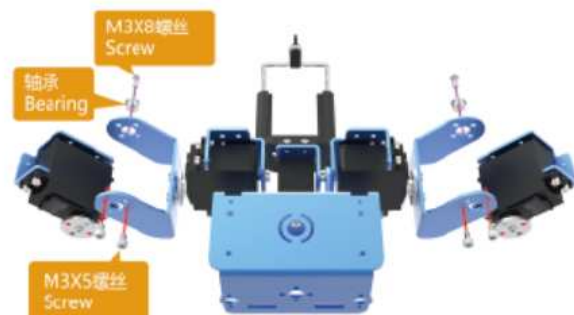
Arm assembly; please confirm whether the servo is in initial position when assembly



10.4. 手部组装，用到A型，B型舵机各一个

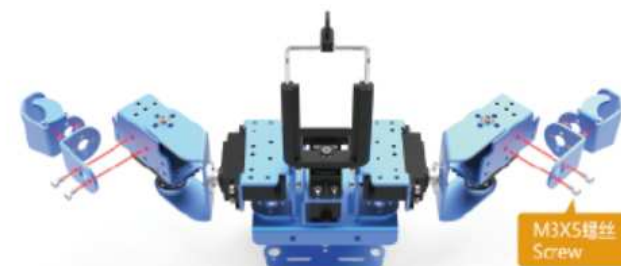
Hand assembly; use one servo in each type A and B





10.5. 安装手掌, 注意区分左右手

Palm assembly; pay attention to distinguish left and right hand.



10.6. 手部组装, 用到A型, B型舵机各一个

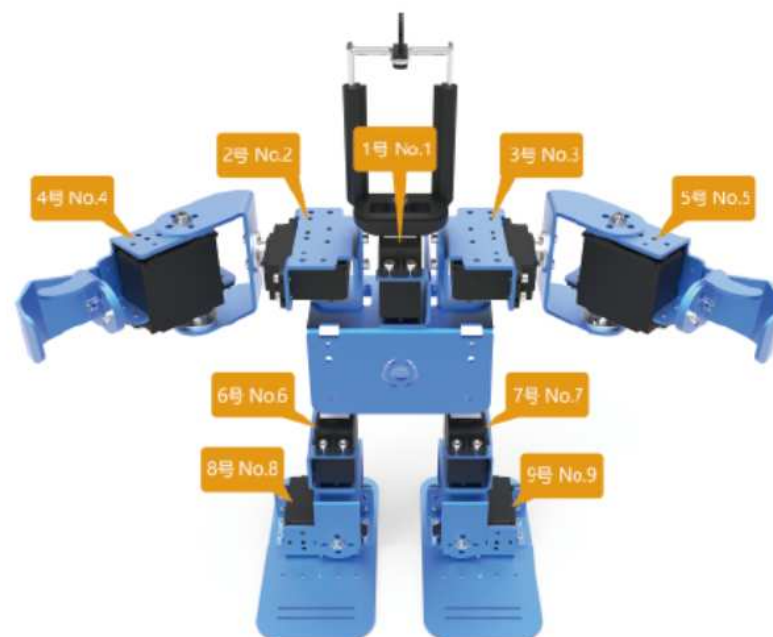
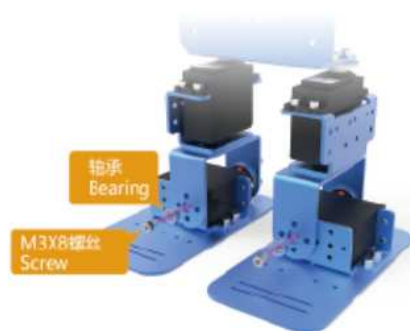
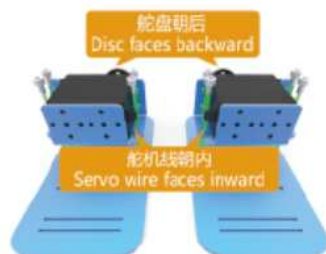
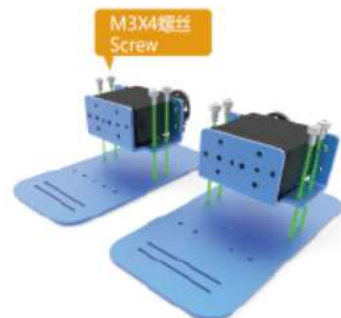
Legs assembly; use one servo in each type A and B





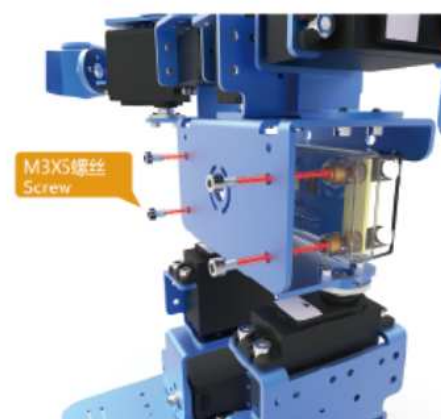
10.7、脚部安装，A、B型舵机各一个

Feet assembly; use servo in each type A and B

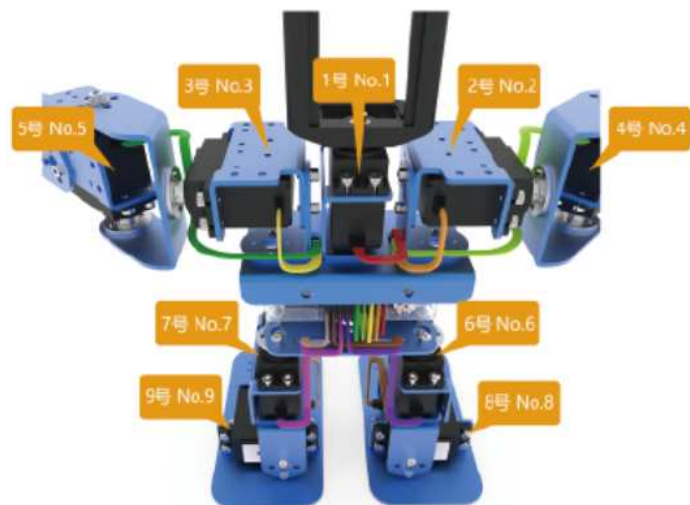


10.8、控制盒安装

Assembly of Control Box



- 10.9. 按机器人舵机编号顺序，将线穿过穿线孔后，接入控制器1-10号接口
Connect to controller interfaces 1-10 after threading holes according to servo



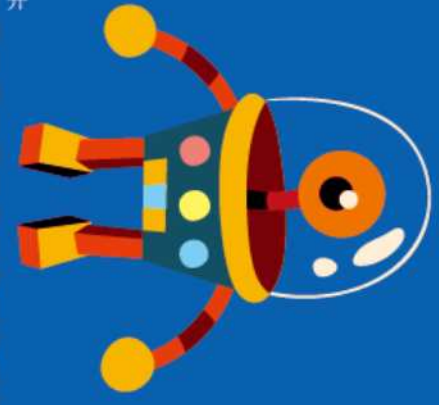
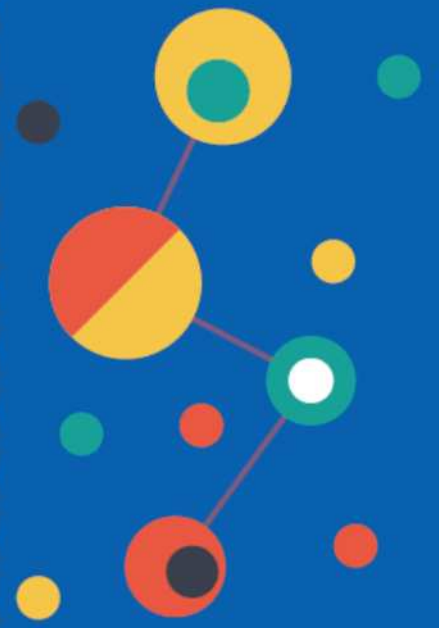
- 10.10. 电池盒安装

Assembly of Battery Case



组装完成!
Finish Assembly

✂ 请沿此线剪开



售后服务卡



售后登记表

温馨提示：如需售后，请填写此卡信息，务必随包裹寄回！

订单编号 _____ 收货人姓名 _____
会员名 _____
联系电话（必填） _____
退货 ☐ 换货 ☐ 维修 ☐
退/换货原因 _____
退/换货地址：福建省厦门市思明区望海路39号512室
收货人：匠睿科技售后服务部
电话：18259069985

退换货须知

- 请在退换货登记卡上填写退换货的需求和原因，如无登记卡，请自备纸张写明订单号和退换货原因；
- 若商品有质量问题，请在签收日期48小时内拍照联系客服；
- 若质量问题退换货，请发顺丰到付，拒收其他快递到付件；
- 寄回商品请确保外包装完好，商品附件齐全，不影响二次销售；
- 如果有赠品，退货时请将赠品一并寄回，否则将以赠品原价在退款金额中扣除；
- 退货请把发票或购物单一起寄回，多谢合作；

建议保留商品7天无理由退换货权利，我们为您提供退换货服务，但请务必保留商品及退换货凭证。

以下情况我们有权拒绝客户的维修要求

- 签收商品90天后提出维修（签收日期开始计算）；
- 由于人为原因，包括但不限于摔落、碰撞、撕扯、浸水，用力不当等引起的零部件损坏，不在保修范围内；
- 由于不可抗力，包括但不限于火灾、台风、雷击、水灾等引起的零部件损坏，不在保修范围内；
- 易耗品；包括但不限于螺丝、电池等不在保修范围内；
- 由于未按说明书操作等错误操作引起的产品损坏，不在保修范围内；
- 其他由匠睿科技判断不属于产品自然损坏的情况，不在保修范围内；

以下情况我们有权拒绝客户的退换货要求

- 签收商品7天后提出退货（签收日期开始计算）；
- 签收商品15天后提出换货（签收日期开始计算）；
- 商品主体、配件、说明书、外包装等人为损坏，影响二次销售；





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FCC INFORMATION

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.